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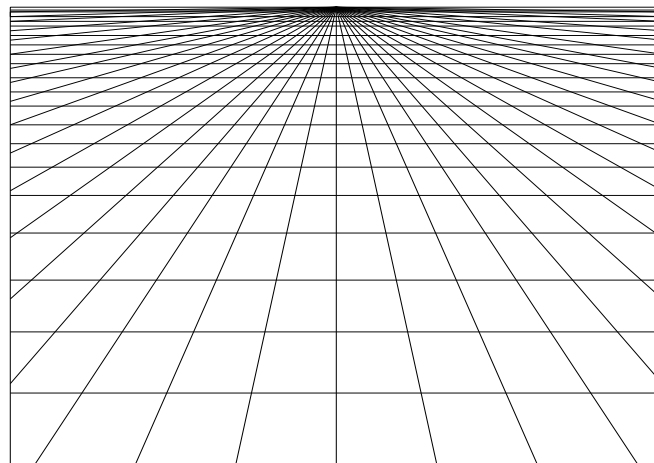
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**Fleeing the flag?**

“Location motivations for Norwegian maritime firms and the public role of  
stimulating shipping competitiveness”

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## **Abstract**

The goal of the thesis is to study reasons and motivations for Norwegian maritime firms to operate and cluster in Singapore. Several theories for the localization of economies relate these motivations to market reasons, not due to knowledge resources. As Singapore has been through the transition from a manufacturer- to a knowledge economy, reasons for locating here for Norwegian firms are obviously not only because of low costs or market proximity. The second main element of the paper looks at the role of innovation enhancing institutions, mainly in the Oslo region, and to some extent in Singapore. One important element in clustering is the role of social interaction and tacit knowledge as geographical proximity facilitates trust and flow of this tacit information, crucial to innovation. The analysis of this type of institution will be illustrated through Oslo Technopole and Oslo Maritime Network and their role in enhancing interaction, innovation and productivity in the maritime cluster of the Oslo region. By focusing on these two main elements, namely what motivates location abroad for maritime firms and what stimulates their innovative capabilities in a specific region, this can hopefully provide some reflections on contemporary issues in Norwegian shipping, though the focus is not through tax incentives as location motivations.

The results of the data indicates that there is a necessity to look beyond tax issues, especially if there is an interest that the Norwegian shipping cluster in general remains within the national or regional borders of Norway and Oslo. Social interaction is of great importance in innovation processes and one of the main motivations for locating abroad. Furthermore, the role of institutions in the Oslo-region for facilitating these processes is at a starting stage, but can in the future play a significant role in the differentiation of the shipping cluster in Oslo compared to other maritime clusters.

**Key words:** Evolutionary economics, clusters, innovation systems, shipping, face-to-face contact

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So, here I finally am after a long process of studying various subjects in different locations, contributing to this final paper.

Finishing in this manner at the Centre of Technology, Innovation and Culture I am first of all grateful at the people here for accepting me and providing me with a solid foundation in understanding the role of science and technology in society, after an initial interest in the narrow subject of the historical impact of economical crises on innovation. This is a knowledge which definitely will continue to grow and assist me when I observe the world, even gray and old, in good times and crises.

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## **1.0 Introductory chapter**

### 1.1 Introduction

When confronted on the issue of outsourcing production and service to low-cost countries, decision makers of multinational firms in developed nations and regions in most cases emphasizes that the core of the knowledge creation remains within the national borders of the home base. In our knowledge-based economy and society, the competitive advantage is namely through the ability of using this high level of knowledge to innovate and facilitate economic growth. It is a trend which has no boundaries across the various sectors of profit maximizing companies in the global production system and the international patterns of trade. The goal of this paper is to look at what the motivations are for Norwegian maritime firms when they cluster abroad, in this case Singapore, and how institutions may enhance innovation and productivity through the various tools these organizations have for the companies operating in the specific cluster. By focusing on these two clusters this can hopefully contribute to the understanding of the global knowledge flow in the globalised economy and illustrate some contemporary issues regarding the localization of the Norwegian maritime cluster, which have strong linkages to international trade and international economy. (Tenold, 2000, pp. 68-69)

The contemporary issue for the ship owners is a governmental decision for the payment of taxes, where the ship-owners have previously enjoyed favorable conditions comparing to other parts of the economy. They ship-owners and their main interest organization have previously advocated for better terms of condition, meaning similar tax levels as EU-members. With this governmental decision of tax repayment, came the promise of stable future tax levels. However, this paper tries to look at other aspects than tax as location desires. As a brief introduction to the cluster concept and the regionalization of economic



activity, the motives for clustering are various, but the role of proximity for firms in the same area is often through the facilitated spread of tacit knowledge through face-to-face contact, hence argued to be vital for innovation, especially incremental innovation, such as optimizing services. Michael Porter, one renowned economist who has done a formidable research on the regionalization of economies, stands with the last statement as he claims that; “the enduring competitive advantages in a global economy are often heavily localized, arising from concentrations of highly specialized skills and knowledge, institutions, rivalry, related business, and sophisticated customers” (Martin and Sunley, 2003, p. 6) In the new globalised economy the key resource for competitiveness are the localized processes in knowledge processes in which people learn about new technology, learn to trust each other and exchange information. In these localized processes the emphasis is on the role of tacit knowledge especially through face-to-face contact and spillovers, a role claimed to be increasing. (p. 17) Clusters are argued to raise productivity, innovativeness, competitiveness and job creation of the firms, the geographical area of the cluster, hence the national economy as well. (p. 22)

The shipping cluster of the Oslo region has for a long time played an important role through value creation, employment and attracting complementary elements such as technology based suppliers. A potential exodus of ship owners, as some pessimists predicts will undoubtedly be a blow for the region and Norwegian-based shipping. Today, the strength of the cluster, as the national economy, is through the high-level of knowledge (vs. for example low production costs), falling into the definition of a knowledge economy. This implies that Norwegian authorities are unable to compete with economies based on low production costs and needs to differentiate through the high level of competence, something which has characterized the Norwegian maritime- and offshore sector the previous years. What would worry the Norwegian minister of commerce however would be if the shipowners as the centre points of the cluster, moved to locations of closer proximity and

similar terms of condition. This would indicate that the motivation was related to the importance of the knowledge and competence in the specific location, not market motivations. (Aftenposten, 21.2.2007, pp. 2-3)

The maritime cluster of Singapore has experienced a substantial growth, and is today what one defines as a knowledge-based cluster, as it was previously oriented towards manufacturing. The paper will investigate this cluster, as it is a fruitful comparison with the Oslo-cluster in terms of the importance of knowledge and innovation.

## 1.2 Research question

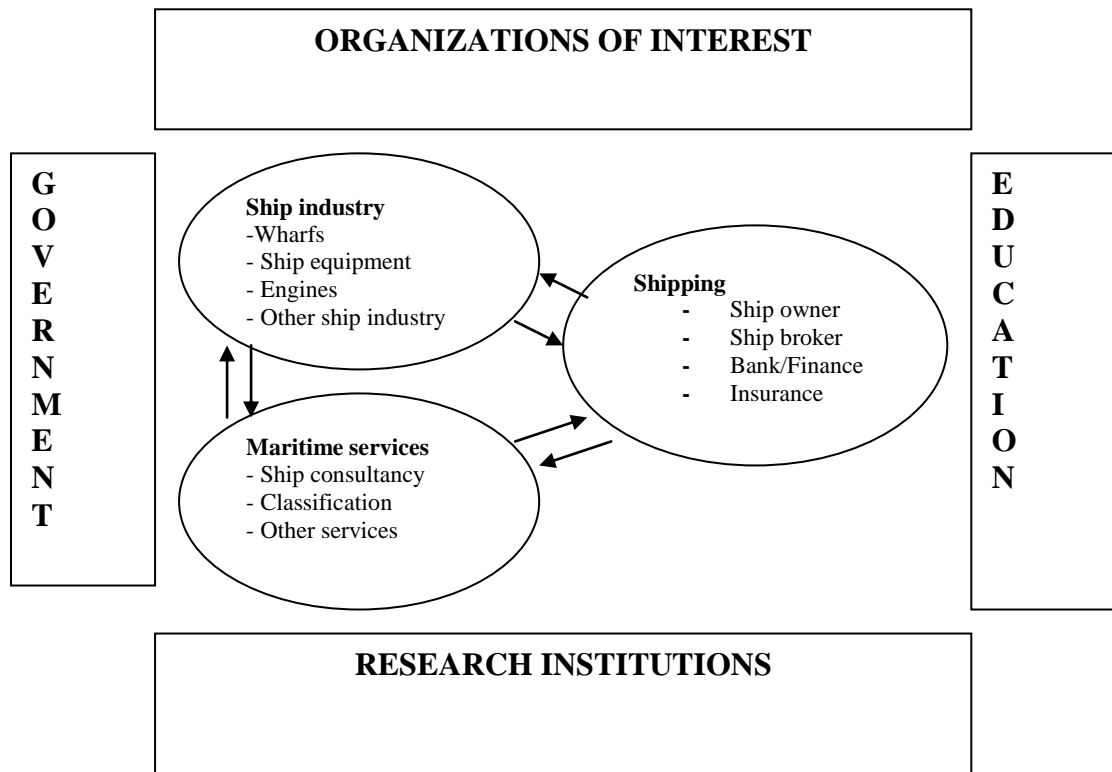
As explained in the previous section a goal of the paper will be to examine what determines the location desires for ship-owners and maritime firms in understanding what the potential driving forces of this “exodus” could be. Hence the first research question:

### **1) What motivates clustering abroad for Norwegian maritime firms?**

When provided with some material on the factors that promote clustering, the paper will look at how institutional forces promote the enhancement of innovation and productivity. This is vital in determining the policy implications for Norwegian authorities in retaining the maritime companies in the country and the Oslo-region.

### **2) How can regional and national governance strengthen the attractiveness of a cluster?**

### 1.3 Basis for analysis



**Source: Benito et al, 2000, p. 3**

The figure above is a illustration of a shipping cluster and how the interaction between the fragments occurs surrounded by the environment of different institutions and organizations.

In the center of the cluster are the ship-owners located and the maritime suppliers are dependent on them. The basis of analysis will be what motivates the interaction between the participants of a cluster and how some institutions may enhance interaction and innovation within the cluster. A cluster is a manifestation of this diamond at work; proximity through the

co-location of companies, customers, suppliers and other institutions amplifies the pressure to innovate and upgrade, as the presence of a cluster benefits productivity and innovation capacities that are hardly matched by companies operating elsewhere. (Porter, 2000, p. 21)

The motivation for applying a cluster perspective on this analysis is mostly because it is difficult to find other concepts with such a broad spectrum of academic disciplines and professions. Furthermore, cluster policies illustrate a growing trend towards “the decentralization of policy responsibility and a focus on the indigenous potential of localities and regions” (Martin and Sunley, 2003, p. 23) The paper will mainly use a perspective of evolutionary economics where dynamics is one of the methodological imperative; this theoretical strand also tries to explain how something has become what it is and why it is where it is. In that sense the paper will include some historical development of the maritime clusters of Oslo and Singapore as well. By applying both evolutionary theories and contemporary theories on cluster it is necessary to compare the two strands and investigate if there is divergence or similarities between the two theoretical perspectives.

The cases of this thesis are two clusters and a specific sector of economic activity, which operates within these locations. Singapore is a beneficial example in this perspective as it serves as an example of one of the Asian tiger economies, which gave the industrialized countries fierce competition in the aftermath of the oil crisis. Today it is a regional hub of maritime activity and a great number of Norwegian firms operate in the region. Singapore also has a strong reputation for a direct governmental involvement in the country's innovation policies, as many of the other policies of the country. Norway on the other side has various tools to utilize in its innovation policies, but they have not existed as long as in Singapore. Furthermore many claim that they operate under different terms of condition and as a resource based economy, some hypothesis claim that this resource-“curse” leads to some

form of inertia, not prioritizing a search for new products and processes from a national perspective. This paper will not challenge this issue to a large extent in the paper, however the reader should have this in mind in reading the countries different measures regarding the maritime sectors operating in their respective countries.

#### 1.4 Scale and scope

The importance of knowledge and specialization became more important in the aftermath of the oil crisis in 1973 as this changed both the activities of multinational corporations and paradigms of economic understanding, and mainly the reason to why this period is included in this thesis. The focus of analysis will be the behavior of Norwegian maritime firms in Singapore and the role of innovation enhancing organizations, analyzed in a Norwegian perspective, and which role they play in the respective environments. Clusters represents a new unit of competitive analysis along with the firm and the industry, suggesting a thinking where companies have an important stake in the business environments where they are located, these tangible assets go far beyond taxes, electricity costs and wage rates. The traditional role of governments in enhancing competitiveness is often through developing policies, subsidies and technology grants. (Porter, 2000, 27) This paper will try to focus on the role of proximity through f. ex face-to-face contact and how this may be enhanced at policy level.

In the global economy macroeconomic policies are not sufficient, therefore the importance of clusters suggests new roles for policymakers both on national and regional level. Analyzing in the narrow terms of sectors, this as the current situation in the Norwegian shipping sector may indicate, degenerates to lobbying over subsidies and tax breaks. (pp. 16-18) A cluster focus highlights the externalities, spillovers and institutions important to

competition. By grouping together these various actors of firms, suppliers, service providers and institutions this may address problems common to many firms without threatening competition. (p. 27) The discussion part will therefore focus on the main differences between these innovation systems and suggestions for improvements and policy implications.

A challenge in analyzing a cluster is determining a boundary of the unit of analysis, or in this case the units. According to Porter the determining factors of a cluster-boundary are the strength of the spillovers and their importance to productivity and innovation, however narrowing down a cluster to a single industry misses crucial interconnections with other industries, for instance the role of the offshore sector, and other institutions that affect competitiveness. (p. 17) Thus, due to the limitations in quantity of the paper, it is unfortunately necessary to narrow it down to a specific sector, though the paper will provide suggestions for further research of a greater span.

The perspective of science and technology in society (STS) seeks to examine science or technology in a social, historical, cultural, political or economic context. This paper analyses processes of innovation and competitiveness within the Norwegian shipping sector, and since innovation is related to new products (technologies), or new processes. The paper will focus on how the interaction within a cluster enhances competition and cooperation, and how the context and environment affects the firm behavior. The social context in explaining innovation processes in clusters and how institutions facilitate social interaction should provide solid contributions to the STS-discipline.

## 2.0 Theoretical framework

Innovation is one of the most important driving forces behind economic growth. (Verspagen, 2005, pp. 489-490) The simplest definition of an innovation is that it is a new product or process or product that is either more profitable or less costly than the products or services that already exists. (Fagerberg, 2005, pp. 4-5) A common feature many contemporary theorists are studying is the role of regions in the innovation process, and although applying different approaches, methods or data they all suggest that something fundamentally important is operating at the regional level, though varying in their explanation on why some regions are more innovative than others. (Zoltan and Varga, 2002, p. 2) There are several forces affecting the innovative capabilities of a region, and economic evolution is about qualitative changes in production, organizational forms and institutions in a historical context. To fully understand how this environment is affecting innovation in regions there is a necessity not only for understanding firm behavior and motivations for operating a certain cluster, but also the systemic character of the region, from policy makers to non-profit organizations.

The following sections will focus on the systemic character of evolutionary economics, especially in a perspective of firm behavior. The following section of the chapter will look at national and regional innovation systems as the environment where the firms operate, but most important will be to focus on theories that emphasizes clustering and regionalization of economies. In the last section of the chapter I will try to bring forward the different perspectives on how clusters originate, and maybe more importantly, how they can be fertilized to be even more innovative.

## 2.1 Evolutionary economics

In a large sense the evolutionary view is an attempt to see the economic system, or parts of it as a continuing process within time and space, sharing some similarities to the field of biology, where a number of species interact with each other and their environment so that each species has a growth function. (Boulding, 2005, p. 11) The methodological imperative is dynamics first, where the essentiality is why and where something exists, is a result of an historical process. (Coriat and Dosi, 2000, p. 4) In his “Wealth of Nations”, Adam Smith saw that market equilibrium was temporary, constantly changing in what might be described as an evolutionary direction, and one important factor to the increase in productivity was a result of human learning involving skills and know-how. (Boulding, 2005, p.12) Different historical case studies have shown that the emergence of civilizations happened through increase of human knowledge and skills, creating positive feedback effects from this increase, creating economic development. It tries to explain development “as an institutional-cultural process characterized by social interaction, even cooperation among humans rather than rationalizing automata and sought to explain disequilibria in historical and geographical terms”. (Cooke, 2002, p. 20) Consequently, Joseph Schumpeter saw innovations as the driving forces behind long waves of growth. One immediate example could be illustrated through the introduction of steam power in the late 19<sup>th</sup> century, which created growth in many manufacturing- and transport sectors over a long period of time.

A change in normal economical patterns in the 1970’s opened up for new understandings and paradigms regarding economical growth, and gave revitalized interest in evolutionary processes. (Fagerberg, 2002, p. 33) Innovations were still considered to be key driving forces of growth, though a more systemic approach was needed as there was a need



not only to understand innovations, but also how they were diffused and spread through various creative and interactive processes. (pp. 28-29, 35) Included in the systemic character were also the social aspects and institutional effects on the diffusion of technologies. Perez (1983) pointed out that the Schumpeterian development grew within the economical sphere as a self-regulating organism which provoked its own innovations and absorbed these by always searching for a higher equilibrium, but he did not include social, nor institutional effects on innovation processes. (pp. 38-39)

Richard Nelson and Sydney Winter focused on the importance of firm behavior in these processes when they published “An evolutionary theory of economic change” and it opened up for more variety in the strategies and outcome of the firms. (p. 46) The behavior of the firm can not be determined without knowing the different types of behavior, market conditions or selection environment which are determinants of how the firm operates. The Nelson and Winter model saw firms as rather resistant to change, “bounded” to the rationality of their actions, but the routines of the firm could also change or mutate, either by sources within the firms f. ex through R&D-expenditure or by imitating others (pp. 47,53) The neo-evolutionary contributions from Nelson and Winter developed further into a more focused view on the role of knowledge in firms, meaning skills, routines and the tacit/codified knowledge, specified as the evolutionary driving forces in the firm and eventually, evolving the system. (pp. 55-56,66) As animals compete in the natural environment for survival, so does the firms compete in their techno-economic and socio-institutional environment through mechanisms of selection hopefully resulting in higher profits than their competitors achieve. This process of selection works differently regarding heterogeneous actors, economic structure, institutions and the technological characteristics of the sector. The models derived from Nelson and Winter sees the dynamics in the economic system as slow changing and gradual, which is contrary to technology gap theories, where

changes are as rather drastic jumps both technical and institutional. (For more insight in the neo-evolutionary vs. neoclassical discussion see Castellaci 2007)

Evolutionary theories try to explain the movement of something over time, and how it got there during this time period. The linkages to evolutionary biology may illustrate more clearly the evolution through various elements which can be linked to firm behavior in an economic system. (Dosi and Nelson, 1994, pp. 154-155) The first is the interaction between different entities, meaning human beings and the environment of artifacts, an evolution and selection that relates to organizational routines and know-how in a firm. (pp. 155-156) The second relates to how opportunities of growth or “fitness” is determined through product quality, prices, marketing and the role of institutions and through an evolutionary model it tries to show how these elements interact to determine a firm’s selection criteria. (pp. 156-157) The last elements concerns processes where agents adapt and learn at the same time as novelties are produced. The evolutionary perspective emphasizes on dynamics and interaction between various elements, not just “survival of the fittest” in an equilibrium oriented market, which takes the actors objectives and constraints as given, without considering how social values and institutions have evolved and affect the actors “rational” choices. Many actors in the economy are not firms, and are thus not subjects to the sharp selection processes, that takes place in a market variety. More generally the evolutionary perspective can be seen as a theory about how a society or an economy learns, leading to a convergence into something which can be close to a optimal behavior, an adaptation which happens under prevailing environmental constraints, opportunities in the light of the values, norms, beliefs, customs and generally accepted practices, are forces that eventually mold certain behavior in the environment, through a trial process of systemic errors, trials and discoveries. (pp. 157-159)

## 2.2 An evolutionary approach to regional clustering

Concentrating innovative activities in one geographical area has been a growing area of investigation the past decades. Some contemporary characteristics are that the spatial concentration of knowledge intensive activities has increased during the past years, and the more knowledge intensive a economic activity is, using the knowledge to differentiate through new or improved products, the more it tends to cluster (Asheim and Gertler, 2005, p. 291) Evolutionary thinking may explain and describe the process of localized, collective learning in a regional context, the adjustment problems that regions may be confronted with in a world of increasing variation, and the spatial formation of emerging industries. (Porter, 1999, p. 411)

Trough the behavioral matrix, A.R Pred showed that the locational choices not only depended on the firms specific competences. It also depended on the availability of information to the firms within centers of production which could be regarded as nuclei of communication and interaction networks, giving high probability in choosing a specific location for obtaining relevant information, and due to this information, has a better chance of surviving, prospering and making the right choices. (pp. 415-418)

The proximity advantages relate to several aspects, among them sharing facilities, know-how and common services, but can also be related to other economic advantages such as work force skills or access to valuable markets. In a so-called horizontally disintegrated system the process of externalization produces agglomeration effects based on low learning- and innovation gains in businesses which are locally competitive, and there is a culture of distrust and a non-existent sharing of information. On the opposite the vertically disintegrated system offers opportunities for interaction as a complement, instead of

competition. This interaction consists of an exchange of tacit knowledge, a factor important in creating innovation. (Zoltan and Varga, 2002, p. 22)

Together with the development of more rapid forms of communication, knowledge which is codified or made explicit in other ways is easily accessed and spread globally without much friction and this implies that tacit knowledge is vital in order to gain competitive advantage (Asheim and Gertler, 2005, p. 292) Transfer or exchange of this tacit knowledge usually occurs through interaction and is difficult to achieve over long distances, as it often is transferred through face to face contact, and usually have cultural commonalities like trust, language and common “codes” (p. 293) This kind of knowledge is regarded as “sticky” and non-articulated, and represents as an argument to why economic activity tend to cluster geographically. Regarding less concrete elements of an innovative milieu, Bathelt, Malmberg and Maskell introduced the concept of buzz and pipelines as important elements in the global knowledge creation. The learning processes that are taking place among actors embedded in a community by just being there is dubbed the *buzz*. On the other hand there is the knowledge attained by investing in building channels of communication, called pipelines, to selected providers outside of the milieu. These concepts illustrate the relationship between innovative regions, and like much of the cluster literature, it emphasizes the tacit- or location bounded knowledge. Bathelt et al are trying to bring it some steps further from the simplified understanding that tacit is local, and codified is global. (Bathelt et al, 2004, p. 32)

Since this paper will emphasize global knowledge flows, and how regionalized economies interact with each other by gaining a competitive advantage by accessing their knowledge pools, therefore benefiting from the locally differentiated capabilities specific for the region, it is important focusing on what makes a cluster successful.(Cantwell, 2005, p. 555) The winners from innovation are those construct capabilities that are localized and nationally differentiated, these successful actors can be multiple, and learning and interaction

within various actors create alternative paths which can be pursued to achieve success. (p. 544) Regarding the pipelines which connects the clusters, another success criteria is the ability to canalize a low cost exchange of information with other vibrant clusters. As a main component of a buzz, face-to-face contact is a very efficient communication “technology”. (Storper and Venables, 2004, p. 1) The importance is further illustrated in the increase of travel activity as carriers of knowledge *in persona*, and this activity has had a higher rate of growth, than both output and trade on the global scale. These carriers of knowledge are termed Argonauts by Annalee Saxenian. These cross-regional entrepreneurs facilitate the diffusion of technical and institutional know-how of the tacit kind. This transfer, accompanied with the movement of individuals has contributed to change of patterns of economical development in a historical context, exemplified through the Meiji restoration in Japan or the transfer of the British textile industry to the United States. (Saxenian, 2006, pp. 14-17)

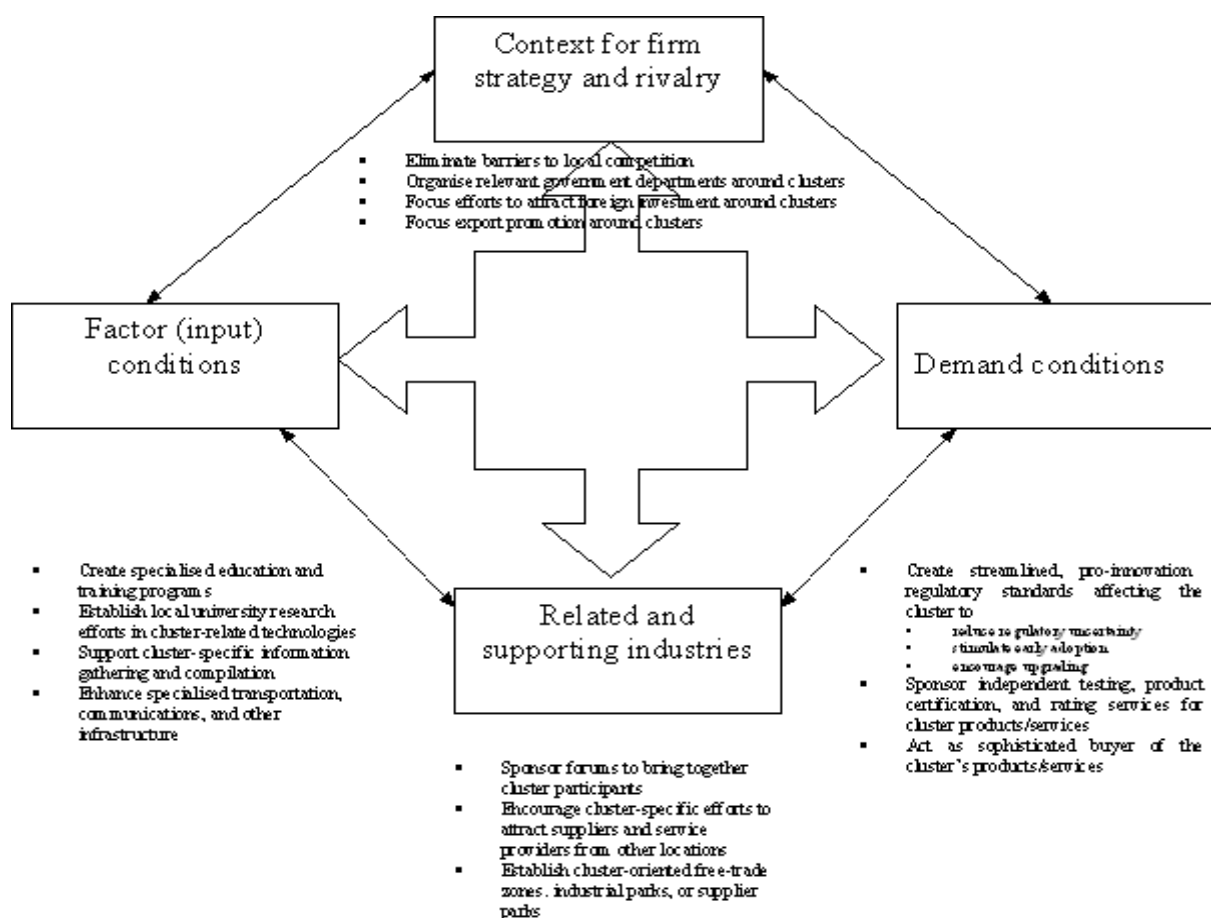
The regional dimension of an innovation system has emerged as an aspect of the interactive model. This perspective focuses on local companies and their contact with knowledge sources outside the firm, f. ex between producers and users of innovation at an inter-firm level and their institutional environment. Many clusters include governmental and other institutions such as universities or interest groups etc., that provide specialized training, education, information, research and technical support. (Porter, 2000, p. 17) These processes are affected by proximity mechanisms which may create cumulativeness of knowledge as a base for innovation. Further, the employment of informal channels for knowledge diffusion provides another argument for this geographical clustering. The paper focuses on the relationship between regional concentrations of geographical activity and competitiveness of individual firms, hence it is important to look at the interactions between the development of innovation and supporting institutions in the regional environment. (Cantwell, 2005, pp. 557-

558) The spillover effects of this interaction attract all kinds of economic activity in certain regions and also the localization of new research units. These forces enhance the feedback of knowledge, expertise and knowledge which occurs within these networks and by tapping into these local, knowledge bases, foreign affiliates may gain a competitive advantage not only for local exploitation, but it can also be transferred back to the parent company, enhancing its global innovation capability. This can be seen as a shift from asset-exploiting toward asset-augmenting, associated with a dispersion of innovative activity of multinational firms. (pp. 559-560)

### 2.3 The regionalization of economies

Michael Porter defines clusters as “geographic concentrations of interconnected companies, specialized suppliers, service providers. Firms in related industries and associated institutions (e.g., universities, standard agencies, trade associations) in a particular field that compete, but also cooperate”. (Porter, 2000, p. 15) The two core elements in Porters definition is that the firms in a cluster are linked both vertical through buying/selling chains and horizontally through complementary products and services. Moreover these linkages involve social relationships or networks that produce benefits for all the firms involved. (Martin and Sunley, 2003, p. 10) Its intellectual antecedents date back to Marshall in the 19<sup>th</sup> century. These clusters of economic activity are a feature of every national, regional or urban economy, especially in the advanced nations, and it necessitates new roles for companies and firm-behavior, for government levels and institutions enhancing competitiveness. (Porter, 2000, pp. 15-16) These interconnections between firms are fundamental to competition, productivity and the pace of innovation as most cluster participants belongs to different segments within the industry, rather than being direct competitors and thus a cluster

perspective also wishes to enhance competition as it rests on both innovation and the search and selection for strategic difference, together with the linkages between buyers, suppliers and institutions for further improving innovation. Clusters represent a combination of competition and cooperation, as the firms compete in obtaining and retaining customers and cooperate vertically, through buyer/supplier relationships. (p. 20)



**Figure 2: Porter's Competitive Diamond**

Source: Google.no (Images) "Porter's competitive diamond"

Michael Porters competitive diamond contains four sets of factors all interacting in a strong systemic sense: firm strategy, structure, rivalry and factor input conditions such as, demand conditions and related/supporting industries. The more intense the interactions between the factors are the greater the productivity will be, according to Porter. The intensity of this interaction is enhanced if the firms are located in certain proximity or a cluster. (Martin and Sunley, 2003, p. 6)

Clusters affect competition within three broad areas that reflect the diamond illustrated in the initial section. First of all it increases the productivity of firms. Second, it increases the capacity for innovation and productivity growth among the cluster participants. Third, and last, it stimulates new business formation that supports innovation and expands the cluster as many cluster advantages rest on spillovers across firms, industries and institutions. Studies on agglomeration economies often rests on cost minimization due to input- or market proximity, as markets have become globalized, technologies have developed and supply sources indicates easier mobility and lower transport and communication costs. (Porter, 2000, p. 21) This interaction between specialized information-generating entities means that firms within a cluster rapidly recognize new buyer needs, as it consists of firms with relationship and buyer knowledge.

Participants in the cluster are also exposed to richer insights as the ongoing relationships between the entities, universities included, facilitate learning and the ease of face-to-face contact. On the contrary the isolated firm faces higher costs to obtain insights as well as a greater need to create in-house knowledge. (p. 23) Participating in cluster may also foster path-dependency and retard innovation. When the cluster shares a uniform understanding of competition this may imply a groupthink, which reinforces old behavior



and suppresses new ideas, as for example, new radical innovations may invalidate existing pools of talent, information, suppliers and infrastructure. (p. 24)

#### 2.4 Innovation systems and the role of institutions

Institutions count in shaping economic coordination, and change ultimately, to some extent, the identity of agents, which operates within this environment. (pp. 6-7) One dichotomy regarding the institutions concerns the efficiency properties and the equilibrium nature of the institutions themselves. Do they exist because they perform a function in the outcome of the selection process, or are they only carriers of history, meaning that they tend to path-dependently reproduce themselves well beyond the time of their usefulness. This question of the role of institutions in the innovation process, will be further analyzed in the discussion part. (p. 7) Economic evolution is about qualitative changes in production, organizational forms and institutions in a historical context. To fully understand the factors that are analyzed in the paper, there is a need to focus on the relevant institutions and the role and impact of innovation policies to firm-level economic activity. Freeman defines a national innovation system (NIS) as “the network of institutions in the public and private sector whose activities and interaction initiate, import, modify and diffuse new technologies” (Castellacci, 2007, p. 18) These institutions range from firms, producers, users and organizations, both public and private.

Related to the evolutionary-model of Nelson and Winter, Lundvall (1992) studied microeconomic foundations of innovative processes from an evolutionary and systemic perspective, focusing on the feedback and interaction between the components of the system. In the systemic approach in innovation theories learning is of utmost importance in a knowledge economy, as it is considered the outgrowth of the productive process. People

learn by doing things, utilizing technologies and interacting with each other. This process can lead to automatic selection of new innovations as a result of an unintended search, as R&D on the other side, is more systematic and intended. (p. 21)

The role of the institutions needs to be included as they are sets of common habits, routines, established practices, rules or laws that regulates relations and interactions between individuals and groups (Edquist, 2005, p. 197) The institutions might be said to define the environment which the firms operate within, and countries with a higher institutional adaptability are likely to enter new techno-economical paradigms in a more successful way, gaining a better economic performance. Large innovation systems require substantial investments which firms alone are not able to sustain, and studying the interaction and interdependence between the bounded rational, heterogeneous actors and the institutional environment could provide additions to the evolutionary view of the National Innovation System (NIS), as this interaction gives foundations to new incremental innovations based on learning processes.

The governmental role in its economic policies is to achieve macroeconomic and political stability, to improve the general inputs to the business and the institutions identified in the diamond theory such as for example educational institutions or providing accurate economic information. The national institutions must provide rules and incentives that will encourage productivity through facilitating competition. The last role is to develop and implement long-term economic program that involves government, business, institutions and citizens. Michael Porter suggests that these four factors are not sufficient, and that a fifth element is needed; *facilitating cluster development and upgrading*. This is due to the fact that many of the innovation advantages of clusters rest on spillovers that involve public entities. He emphasizes that this is development and upgrading, not cluster creation, as new clusters emerges from established ones as the economy develops, as a cluster should pass some sort

of market test. What remains for the fertilizing government influences are removing obstacles, relaxing constraints and eliminating inefficiencies that hinders productivity and innovation within the cluster. This upgrading function means at an early stage to improve infrastructure and eliminating “diamond” disadvantages, and at a later point, removing constraints to innovation. (Porter, 2000, pp. 26-29)

The strength of government and policy intervention can be narrowed down to two opposites; proactive or business neutral. The first is about picking winners, or that desirable industries are targeted for support as they offer greater prospects of wealth. At times the perspective of this industrial policy reflects a zero-sum vision that the pool of demand is fixed and the aim for a nation is to gain a larger share. What matters is not what a location competes in, but how it does so. Cluster theory welcomes foreign firms and external output rather than excluding them, as cluster theory is not based on market share-thinking, but rather on dynamic improvement. The underlying view in cluster thinking is that competition is a positive sum game, in which improvement will expand the market and many locations can prosper, becoming more productive and innovative. Furthermore, company relationships with government bodies and institutions such as schools, researchers and other relevant actors are necessary to benefit on common specialized infrastructure such as port facilities. (p. 29)

Assuming that the enhancement of innovation and competition on a cluster level is fruitful, this activity may be organized in various forms at national, state and city levels. It seems often that firms themselves are more interested in narrow efforts such as tax policy or subsidies. However, a dialogue between firms, government and universities moves to a broader and more specific level where action can be taken. The successful cluster initiatives have some common features which Michael Porter identifies:

- *A shared understanding of competitiveness and the role of clusters in competitive advantage*; competitiveness is defined by productivity and innovation, not low wages or taxes.

Understanding what influences productivity and cluster enhancement goes through early and ongoing communication and discussion to educate the cluster participants about competitiveness and helping to shift their mind-sets.

- *A structure embracing clusters within a nation, state or region*; making priorities of having a proactive agenda in economics is not optimal, as it disenfranchises large parts of the private sector. Successful initiatives include not only emerging clusters, but also traditional and even declining ones. Furthermore, emerging clusters should have local foundations and have passed a market test.

- *Appropriate cluster boundaries*; as the definition includes industries and institutions with important linkages and spillovers, these boundaries should reflect economic reality, not necessarily political boundaries. In the specific cases of the paper, the author has done so, as he treats Singapore as a region, though in fact it is a nation state.

- *Wide involvement of cluster participants and associated institutions*; these initiatives should include all firms of various sizes and representatives of the important and related institutions, even the skeptical and opposing ones, as these are important to reach and educate. Eventually these initiatives must carry on with those who wish to improve the conditions for all.

- *Private sector leadership*; companies can usually better identify obstacles and constraints in their own business paths than public institutions can. This also reduces the political content

of the initiatives while taking advantages of the superior implementing abilities of the private sector.

- *Close attention to personal relationships*: This is highly relevant to the analysis of the relevant institutions of this paper because emerging clusters does not guarantee functioning linkages. “The benefits of clusters flow from personal relationships that facilitate linkages, foster open communication, and build trust” (p. 32). As mentioned earlier, information and education is essential to productivity and if this is easily transmitted it will strengthen the cluster and endure even after a project has ended. If trust or the flow of information is lacking, neutral facilitators may help to redevelop these relationships. It is important that these successes should be widely publicized to create awareness of the industrial strength of the region (pp. 31-32)

As there are lacking elements in completing an agreed and shared definition of a cluster, this implicates that there are no single policy towards the cluster label, instead there are several. One agreement across the several policies is that is unlikely to succeed in creating clusters *ab initio*, and that a market test must be passed. The policies should focus on taking advantage of already existing resources as the four characteristics above of cluster initiatives indicates. There is a tension in cluster policy-making between including as many firms as possible from various sectors or that they should be cost-effective by targeting some specific firms and sectors, close to an industrial policy of “picking winners”. (Martin and Sunley, 2003, p. 24) Favoring some clusters is bad policy, Porter says, and authorities should avoid “smokestack chasing” such as tax incentives and policies produces an inward zero-sum competition, something which cluster policies also may create. The potential dangers associated with promoting clusters are several. The policies may create an exaggerated view on the firm performance which is determined in the local context, not comparing its

competitive advantage to other firms outside of the location. The decline of clusters may happen within the cluster or a result of external conditions such as technological discontinuities. This decline will be more rapid if the clusters suffer from a lock-in of established ways of thinking. Some suggests (Amin and Cohendet.1999) that such a reliance of face-to-face contact and tacit knowledge can make the local network vulnerable to lock-in. In other words an offensive cluster policy may actually decrease the innovation rates, instead of increasing them, therefore it is suggested that authorities should concentrate on encouraging productivity improvements for all local firms without necessarily committing to a cluster mind-set. (pp. 5-10)

Some critics (Martin and Sunley, 2003) warn about the cluster approach as a chaotic concept and a policy panacea, and they suggest using the concept with more caution. Porter utilized the concept analytically, but also as a key policy tool. His critics claim that his cluster concepts have become some kind of academic and policy fashion item. Further the cluster metaphor is too generic resulting that it is vague and applies a too wide spectrum of industrial groupings, specialization, cases and interpretations to give a beneficial contribution to the understanding of economic geography. To minimize the possibilities of interpreting the empirical material in different ways the paper will mostly focus on the process of social network theory in firm thinking and how these processes may be enhanced. Furthermore, the cluster concept lacks clear boundaries both at a industrial and geographical level. The problems around fixing cluster boundaries is further enhanced by the constant evolving of the system, as new firms and industries emerge or old ones decline. (pp. 5-10)

The importance of local, social networks for the flow of knowledge and information within a cluster is stated to be under-theorized in Porter's works. Works from others like Hassink (1997) and Maskell (2001) have given fruitful contributions to the empirical material in explaining cluster development in terms of local knowledge and collective learning.

However, the local knowledge in a cluster theory faces some difficulties. The first challenge regards the role of the tacit knowledge, creating boundaries between various forms of knowledge such as tacit/codified or formal/informal. This paper will treat tacit knowledge as a type of knowledge where we know more than we can express verbally, in other words, a knowledge that is not easily transferred. The author acknowledges some of the critiques points regarding a clear cut boundary between the types of knowledge and the oversimplicity in the explanation of linking one form of knowledge to a certain location context. The second critical point relates again to not making a clear understanding of what tacit knowledge is and how it acts as a source of competitive advantage, pointing out that the tacit knowledge may also be embedded in the firm routines. (p.17) The concept of a “buzz” or something unexplainable which resides in a specific location may easily be treated as a black box. However, by analyzing firm behavior of maritime companies in Singapore I will take this for granted by studying the firm’s routines.

### 3.0 Innovation in shipping

The previous sections have emphasized various aspects of innovation perspectives in a general view. Before looking specifically into the innovative processes of the specific cases of the paper, it could be very useful to look both at what characterizes innovation in shipping, whether the processes are different from others sectors of the economy. Furthermore, stressing the systemic nature of the evolutionary perspective I will briefly look into the history of the Norwegian shipping sector. Additionally it will also focus around the clusters of the Oslo region and Singapore, their characteristics and how they have become what they are.

Even though a large share of the maritime industry is involved in low technology fragments such as oil transportation, the industry has become more specialized especially in its differentiation of services, chemicals transport is one segment which has grown the passed years. Norwegian shipping firms has to a large extent developed in providing differentiated services as the table of sectoral growth of Norwegian shipping shows. (Jensen, 2003, pp. 93-94)

**Table 3 Sectorial growth in Norwegian Shipping**

	<b>1974</b>	<b>1988</b>	<b>2001</b>	<b>Growth % 1974-2001</b>
Passenger ships and ferries	350	566	1136	225
Tankers	21470	14317	29057	35
Combination ships	7545	4464	4155	- 45
Bulk ships	9385	7305	11004	17
Other dry cargo ships	3190	1870	5066	59



Offshore services ships	-	324	737	-
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(Source: p. 94)

Jensen's paper on innovation in Norwegian shipping shows a strong emphasis on competence and networking. The capability of the sector means that both competence and skills must work together, something which happens in relationships between individuals. These relations may create internal capabilities within organizations or external if the interaction is external between organizations. However, the latter is said to be the cooperation where the total capabilities of skills, competence, capability and strategic assets increases relatively fast, which again provides a competitive advantage. (p. 101) Through the perspective of the competitive diamond of Porter the maritime industry can be seen to have intensive intra-industry rivalry, demanding customers, a developed network of suppliers and general factor conditions required in a dynamic industrial cluster. (Benito et. al, 2003, p. 203)

### 3.1 A historical introduction to the Norwegian shipping sector and the maritime cluster of the Oslo region

The shipping sector and maritime industry has as far back as the Viking age (750-1030 AD) played an important historical role in Norway. This paper will mainly emphasize the period after the international oil crisis from 1973, as this crisis made fundamental changes to global patterns of trade. Aggressive competition from low-cost countries, especially in Asia, forced the industrialized countries in a path of basing their creation of value to their high level of knowledge. The knowledge intensity gave advantages in differentiating through specialized

products and services, a development reaching many sectors of the economy, as well as the maritime. (Jensen, 2003, p. 1)

The oil crisis of the seventies was not the first challenge the Norwegian shipping sector met regarding flexibility and adaptability. There have been several declines in the sector, one major blow was the transition from sail- to steam powered boats in the merchant fleet. This has been a case thoroughly examined by economic historians, especially in the perspective of path-dependency. By depending on sail, rather than more reliable steam, the sector lost competitive gains and lost profits which were illustrated through the highest accident toll of the different national fleets. By the 1890's the final blow for the traditional shipping was thrown for the earlier vibrant region on the south coast and around the Oslo-fjord. (Skipsfartens bok, 2007, p. 14)

This is one classic example of inertia in the Norwegian shipping sector, but the focus of this paper is how the sector became what it is today and where it is located. To understand more fully the dynamics of this development the main period to be analyzed is the one following the oil crisis of 1973. This crisis was triggered by the increase of oil price and the subsequent cartel policy of the newly established OPEC and its member states. There was a strong, unexpected reduction in the growth of tanker transport demand. The strategies of the various actors within the sector reflected an anticipation of sustained growth in demand, with the oil price increase, but this growth failed to materialize. The period after the growth in oil prices was characterized by inertia, as the agents of the sector acted as the problems were transitory, an attitude illustrated by a further growth of tanker tonnage despite stagnating demand. (Tenold, 2000, pp. 116-117) There were claims that the Norwegian ship owners were harder hit than their international competitors due to heavier investments during the earlier demand increase (see Tenold 2000:201 for summary of this discussion)

During the period from 1970 to 1987, Oslo consolidated its position as the main center of Norwegian maritime activity. The number of ships registered in Norway was reduced by two-thirds during this period, and there was also an increase in co-ownership and limited partnership, as to the traditional view of the individual ship owner. The analysis of Tenold shows that in the period after 1975, the Norwegian fleet became more sophisticated. The importance of the traditional large tankers and bulk vessels was reduced, and specialized vessels such as passenger ships, gas- and chemical tankers became more important. The strong reduction of the Norwegian fleet can be seen as an effect of the crisis, but the ship owners were encouraged to find new and profitable niches. As the companies embraced new opportunities through specialized shipping, these market segments provided a good basis for Norway's continuing importance as one of the world leading, maritime nations (pp. 329-330)

The second shipping crisis in the 1980's was a result of a plunge in freight rates, as the total demand of these rates was reduced by 25% in the period 1980-1985. The structural changes in international shipping as a consequence of this plunge marked the era of the emerging maritime nations, where Singapore will provide as an example in section 5.2. There was a continuing growth of vessels registered in these "open registers" or "flags of convenience", particularly many Asian countries increased their share of the world fleet. (p. 343) The 1980's was illustrated as a flight from the Norwegian flag. The two main reasons for this reduction in the share of the fleet was that Norwegians were more severely hit by crisis than ship owners in other countries, but another reason was that the ship owners were presented by a profitable investment alternative, which was the development of the Norwegian offshore industry.(p. 363)

The period after 1987 characterized the Norwegian shipping through three main features. First, ship owning from a Norwegian base was unprofitable, second, reduction of fleet investments was a consequence of growing investments related to the growing offshore

sector. The last element was the degree of internalization as there was an increase in foreign registered, Norwegian-owned vessels. These factors provided the foundation for the concentration of ship management and offshore industry, where the companies were able to utilize their managerial, commercial and technical knowledge without having to invest heavily in ships. (p. 365)

In 1987 the government established the Norwegian International Ship Registry as the one of the first policies to establish better terms of condition for Norwegian ship owners in a period of decline of the share of the international tonnage, which had reached a share of 6% in 1991. Another efficient instrument was the tonnage tax which was introduced in 1996, changed the pattern of development for the maritime sector in the Oslo region. This type of taxation directed towards ship owners gave them tax cut on their profits, paying tax after tonnage, not profits. The introduction of the system created debates among economists, for giving certain benefits to some sectors rather than others. The system made it much more attractive owning and running ships from Norway, though it did not create an international competitiveness. The number of ships which fell under this system was in 1999, 1200 ships, three years later, in 2002 this number had fallen to 1085 ships. In 2003 the share of the world tonnage had sunk to 3,3 %, there were mainly two causes for this general decline. First there were some adjustments of the tonnage tax system, second is that several European states has introduced a zero tax system on their respective ship owners and subsidizing sailors. These developments provided a loss of the international, competitive advantage for Norwegian maritime firms. (Jakobsen, 2004, pp. 9-16)

The cluster of the Oslo region is regarded more or less complete; the only absence is shipbuilding facilities. The majority of the Norwegian ship-owners are located here, with 46,9% (2006) share of the member companies in the Norwegian Shipowners' Association. It employs 10356 (2003) persons and stands for 11,5% of the total value creation in the Oslo-

region. The cluster is dominated of shipowners and specialized serviced. Since the shipowners are characterized as the centre point in the cluster, they are important in linking other maritime clusters from other parts of Norway as well, such as technology suppliers.

(Regional Index, 2006, pp. 26-27)

### 3.2 The maritime cluster of Singapore

In 1965 Singapore gained their independence from British colonial rule. Being a country without any natural resources, the country sought economic growth by developing its manufacturing industry. A characteristic of the Singaporean process of catching up share similarities with the other “tiger economies” as they focused on extensive structural changes to reach the level of western countries. Governmental influence, multinational companies and foreign direct investments were important in this process. These policies have throughout the late part of the last century placed Singapore above the industrialized country average.

(Fagerberg and Godinho, 2005, pp. 520-521)

This policy thinking is illustrated amongst others in the cluster policies of Singapore which are strongly interwoven with the national strategies. In 1968 the Singaporean authorities decided to open their flag to ship owners of all nations, and tried to establish a close link between the national economy and the shipping sector through tax rebates offered to ship owners employing domestic crews. That the policy was successful is illustrated by a substantial growth in their share of the world fleet in a ten-year period, creating a strong, national fleet and a vibrant shipping environment augmented by the importance of Singapore as a regional, maritime hub. Some have termed the policies of the Singaporean authorities and the Economic Development Board as “strategic pragmatism”, and regarding the shipping

industry, this may be a fitting assessment. (Tenold, 2000, p. 11) In the beginning of the 1980s fleet size *per se* was no longer as important for further improving Singapore's maritime position. In 1982 one bureaucrat in the Ministry of Communication claimed that "unlike the early years of the open registry, Singapore is not interested in merely attracting more ships to its registry. It would prefer owners to set up their operations in the country and impart some know-how to the shipping community". (p. 29) From this point it is obvious to see the new strategies of the Singaporean authorities and is related to more contemporary issues in the location desires of Norwegian shipowners. Singapore has long had great importance for Norwegian maritime companies abroad. The proactive policies is claimed to be the main reason that around 50 shipping companies are established in Singapore. As one of the main research questions is what motivates Singapore as a location, this will be further dealt with in the discussion section.

By 1987 the structure of the industry had been changed as the hegemony of the traditional maritime nations had been successfully challenged by the emerging maritime nations. A common element of the growth of these economies was the attempt to encourage the entry of foreign, maritime companies and the expansion of local companies through specific policies. Singapore is perhaps the best example of the relationship between shipping policy and fleet growth and by 1987 the country was ranked as number 13 among the world's leading maritime nations (p. 343) Singapore today is an established cluster with a comprehensive range of maritime industry and services consisting of more than 4,400 companies employing about 100,000 people (MPA, 2007, p. 4)

One of the important public tools in creating a dynamical and innovative shipping cluster in Singapore is the Maritime and Port Authority of Singapore (MPA) was officially formed in 1996 under the Ministry of Transport, and has in the last decade evolved from having a regulatory role to be a lead agency in the promotion and development of the Port of

Singapore and the maritime industry. A number of initiatives related to research and development have been undertaken by the organization in partnership with universities and other institutions. In 2003 it established the 100 S\$ (400 mill NOK) maritime innovation and technology fund to enhance research and capabilities in the maritime technology cluster. (Lloyd's list May, 2007, p. 22)

### 3.3 Earlier research

In his studies of technological districts Marshall (1962) analyzed the geography of the British textile industry in the 19<sup>th</sup> century, where a key task was to study the important external economies that could be secured by the concentration of small businesses of similar character in particular localities (Cooke, 2002, p. 22) The firms and factories clustered with an imitative motive, in this case in the district of Sheffield, literally as a “spin off”, but also due to the ready availability of skilled labor, supporting trades and specialized firms within in different branches of production. Since then, it is recognized that changes in technology and competition have diminished many of the traditional characteristics of the role of location, even as old reasons have diminished with the impact of globalization, giving influences on clusters such as complexity through knowledge-based and dynamic economies. (Porter, 2000, p. 1)

Extensive studies of maritime sectors have been carried out in many countries, especially in Europe on the Greek shipping industry (Grammenos and Choi, 1999) and the Dutch maritime cluster (de Langen, 2002) (Benito et al, 2003, p. 205) The first study of maritime, economic clusters in Norway was the was done by Torger Reve et al (1992), concluding with the characteristics of the Norwegian maritime cluster as the most dynamic

and strongest in the country. The study pointed out shipping and ship equipment suppliers as having the best competitive strength in the international markets, with technology inherited from fishery and shipping, which have had an important historical role along the coastline of Norway. Knarvik and Steen (1999), looked at potential linkages between service-oriented shipping sectors and the manufacturing-oriented ship industry sectors (p. 205) When the researchers behind the project “Et verdiskapende Norge” (A value creating Norway) again analyzed the Norwegian maritime sector in 1999 (Reve and Jacobsen.2001) the study had a richer empirical basis than the first analysis by Reve. The goal of this paper was to find out whether the cluster had strengthened or weakened. The paper identified several strengths and weaknesses of the cluster and among the strengths were: - The maritime cluster of Norway was complete. – The maritime cluster had strong linkages to other economic clusters in the Norwegian economy, such as offshore. – The cluster was a tight network of knowledge linkages – The development of the cluster was a result of a long, contingent historical process.

The paper identified several weaknesses in the maritime cluster in Norway which were: -Signs of path dependency as there seemed to a sign of a lacking appetite for technical and commercial innovation – Even though there were strong linkages between the various agents, these linkages had potential for improvement. – There was a potential threat to the competence of the labor stock of the industry, as the number of Norwegian sailors and dock workers was shrinking. – A tendency away from individual ship owners to new structures of ownership could alter the localization of their headquarters. (Reve and Jakobsen, 2001, pp 220-221)

Reve et.al analysis showed that there was a strong degree of competition within the cluster in Norway, however regarding cooperation; the results showed that this happened only through working for better terms of condition, but co-working in areas such as research



and development happened seldom, an indication that the linkages had strong potential for improvement. Another factor for improving innovation within the cluster was increasing R&D spending, and how well the sector was cooperating with the research- and education institutions. The analysis of Reve et al showed that only 32% of the ship industry and 12% of shipping companies were in close contact with research institutions. (pp. 211-212)

## 4.0 Methodology

This section will present and discuss the research design of the paper, the choice of interviewees and the design of the interview guide, which will be briefly discussed as well together with the survey design.

### 4.1 Research methods

By applying theories in evolutionary economics, clusters and perspectives from National Innovation Systems (NIS), these perspectives have been used in the design of the survey related to the behavior of Norwegian maritime firms and their motivations for clustering abroad and how institutions affects innovative capabilities within a cluster, shaping the guide for the qualitative interview. The empirical material of the paper and the analysis was obtained through a Questback-survey and in-depth interviews in attaining a clear and whole understanding of the subjects of study, the shipping clusters of Oslo and Singapore. A case study is preferable when trying to answer a “how” or “why” question and is a common research strategy in social sciences. In studying organizational phenomena, such as Oslo Technopole, it is a preferred strategy as it tries to understand complex social phenomena. Furthermore, by including two cases it will be a multiple case design which is likely to be stronger than single case studies, for cross references and comparison. (Yin, 2003, pp. 1, 18)

One challenge in including two cases in a short paper is undoubtedly related to limitations in including material and different perspectives in analyzing the objects of study, namely the maritime clusters of Oslo and Singapore. The case study is similar to a causal one in explanatory theories where social-interaction theory was the most suitable. In these case

environments there are overlapping professional networks with ongoing communications, exposing the researchers and the users to each others worlds. (pp. 20-21) Findings and results from previous empirical studies on the Norwegian maritime sector has also served as background material.

In gathering data on firm behavior and motivations for clustering a Questback survey was sent out to the Norwegian maritime firms in Singapore. It was sent out to 106 companies, where the contact information was obtained from the home-page of the Norwegian Business Association of Singapore (NBAS). 25 of the companies responded, a percentage of 23,6%, which is a fairly low respondent rate, hopefully not affecting the goal of illustrating a real cluster where all fragments are represented. However, it is rather surprising that a Questback-survey which is rather quick and user friendly comparing to other electronically based surveys did not receive a higher respond rate.

The methodological feedback from the respondents identified some weak spots in the survey. For instance, there was no possibility of having alternative answers, for example several motivations for establishing in Singapore. However, this made it possible only the main motivations. It was also problematic to give a clear answer on how much was spent on R&D and defining what it was. Ultimately, one issue regarding misspelling, the survey asked for their evaluation of the role of "Port Management Authority" instead of "Maritime Port Authority", which is the correct name. This could also explain the relatively high rate of "don't know" to this question. The designing of the survey tried to include as many and different elements as possible which the theoretical framework set as motivations for clustering, to give a comprehensive understanding.

The second source of data material in analyzing the role of institutions came through qualitative in-depth interview, which were done with a tape recorder and later transcribed and analyzed. The purpose of an interview is to get full and comprehensive information of how

individual understand their own situation, or in this case organization. The main challenge in this situation is to create trust between the researcher and the user, and there are several pitfalls when it comes to the analysis of the data. Does the user tell what the researcher wants to hear or do they use this forum as a mean to express their meanings to a larger audience? The latter could be possible as both a firm with strong commercial interests and an organization which has the creation of positive sentiments about the maritime cluster of Oslo as one of their main tasks. (Thagaard, 2002, pp. 83-108) In designing the interview guide (see appendix), it is important to use open questions which encourage the informant to speak, furthermore it is natural to vary the order of questions as some themes emerges spontaneously. (Arksey and Knight, 1999, pp. 98-99) The challenge with this kind of data gathering is that the information goes through several sets of analysis, and it is important not to force it into predefined categories. The theories included in the paper have undoubtedly shaped the analysis, but at the same time I have tried to have an open mind.

#### 4.2 Interviewees

Initially the motive was to interview three study object to shed light on the research questions of the paper. As governmental institutions in Oslo and Singapore, Oslo Technopole (Oslo Maritime Network) and the Maritime and Port Authority of Singapore (MPA), were identified to illustrate the role of innovation enhancing institutions within the maritime sector. Obtaining an interview with the MPA proved to be a challenge as they were unwilling to meet, as they felt the interview crossed departmental borders regarding the questions of the guide. Understanding that the MPA is quite larger than Oslo Technopole, the author has difficulties hiding the disappointment as it resulted in lacking data material in accomplishing

the goal of the thesis. However MPA was assisting in providing material about the organization, some of it relevant for the purpose of the paper.

The interview guide for both organizations was identical, for the purpose of the cross-case perspective, and the guide is included in the appendix of the paper.

In the analysis of Oslo Technopole several aspects were included for a full comprehension of its role in the innovation process of the Oslo cluster. What are the role, history and goals of the organization? How is it funded? Through which tools did this innovation enhancement happen, and last and important, the reflections on the future of the organization and the sector. These questions did hopefully contribute to relevant answers to be applied in the analysis.

Emphasizing the bottom-up perspective as well as it illustrates firm behavior, the head of the Asian operations at Barwil Unitor (Wilh. Wilhelmsen), Bjørn Tønsberg, was interviewed at his office in Singapore. Furthermore he was at the time responsible for NBAS, something similar to a social and professional network for Norwegian firms in Singapore. The interview was conducted to gather information about both of the organizations. Related to firm motivations it has provided with fruitful information which the survey was not able to include, but the questions were similar to the ones in the survey and regarded history, motivations for the location, headquarters and its location, research and development, the role of face-face-contact, and finally reflections of the future. The material in section 5.2 is based on the material from the two interviews, whereas the material in section 5.1 is largely based on the survey, hence no references, but the recordings of the interviews are available on request and the survey results are located in the appendix.

For material on the role of NBAS questions the regarded background, the role of social networks in creating knowledge and how this was done.

## 5.0 Overview of the findings and discussion

### 5.1 What motivates clustering abroad for Norwegian maritime firms?

The results from the survey shows that the span of the Norwegian maritime companies in its operating fields are quite wide. The respondents represent more or less a complete cluster where the large bulks are the service-based firms. (See figure 1, The Norwegian Maritime cluster for illustration.). The service firms are either ship owners or in consultancy, mainly in finance, insurance and ship consultants. The ship owners have twice the share of representation compared to firms within ship industry, where the majority of the firms are concentrated on ship equipment, particularly drilling due to the high profits in the production of drilling equipment.

The time of establishing in Singapore for the Norwegian firms largely took part in the two periods 1995-1999 and 2005-present. Comparing with the given conditions for the maritime companies during the period subsequent to 1995, the tonnage tax was introduced in 1996 to strengthen the international competition of the firms. This did apparently not affect the location desires for the maritime firms. What is rather surprising is the small growth of Norwegian companies establishing in Singapore during the shipping crisis in the beginning of the eighties at the same time as their flag policies were starting to give results.

The increasing number of firms establishing themselves between 2005 and today in Singapore has a large number of firms concentrating on drilling equipment due to the favorable market conditions. However, while looking at some of the motivations for establishing a maritime business in Singapore, proximity to the market is not the only reason for moving large segments of the business to Asia, though the largest share of the companies had this as a translocation motive. Forty percent of the companies asked in the survey argued that benefits created by operating in a more or less complete and dynamic cluster represented

one of the main motivations. Other firms emphasized the importance of a positive business culture and a predictable tax policy, and one interesting answer showed that the respective company was moving after clients who moved for market reasons. Bjørn Tønsberg, head of Asian operations in Unitor/Wilh.Wilhelmsen, was initially based in Singapore as a line agent in Asia in 1972, a motive similar to a market motivation. Even today this traditional ship owner-company would not have changed its headquarters from Oslo, even though it was hypothetically cost-free. Maintaining the Oslo region as a dynamic shipping cluster is still important for the company, unfortunately Tønsberg admits that the business world does not work in this manner and predicts further location changes for Norwegian ship owners followed by their clients. The importance of studying the location behavior of firms happens mainly through the geography of their headquarters, as these offices has an important function of value creation. This means that decisions related to strategy, selection and their resource- and market allocation is decided here. Many models of corporate organizing argue that environments of competence are placed in close proximity of the headquarters as well, to strengthen the strategic decision making. (Jakobsen, 2004, p. 11) The tradition of the Norwegian shipping sector and the type of ownership has been regarded to be that of a personal and direct kind of ownership. International trends that indicate a larger degree of a fragmentation of the ownership structure can pose a challenge to the location of ship owners. This location can again determine where they choose to invest their assets, as they are likely to have more knowledge of investment possibilities in their close proximity. (pp. 13-15)

The vast majority of the companies in survey had a main office in the Oslo region or the southwest coast of Norway. And nearly twice as many would not move their headquarters as the ones who would, though a large part was uncertain in its location desires.

The motivations for clustering abroad or Singapore in this case is mainly due to market motivations, but the role of a dynamic and attractive cluster is almost as important.

This paper focuses on the important part played by tacit knowledge as this is transferred in the most optimal way when agents, firms or individuals, are in close proximity to each other. Innovation happens through the cooperation between demanders and providers, in a process of optimization. More or less all of the maritime firms find this interaction very important or important in optimizing their processes.

Furthermore the firms acknowledge the importance of face-to-face contact in these innovation processes. Whether this interaction creates and enhances trust is another question, only a small proportion (28 %) finds sharing information with competitors to enhance innovation important. Thus, it should be noted that “competitors” could be defined in a direct manner, and that sharing information is only restricted when interacting with direct competitors. The share of firms which credits this interaction with some importance should indicate that the aspect is not irrelevant and that there is a notion of trust between the companies and even towards competitors. This is known as a vertically disintegrated system, where there is more trust than distrust, and is illustrative of the important role of tacit knowledge plays in a shipping cluster.

Embracing the role of face-to-face contact in innovation processes still needs a further focus. The role of carriers of knowledge was mentioned previously in the paper, as this could be an indication of how important it could be for company obtaining information through direct contact. About one-third of the Norwegian companies in Singapore spend quite a fair share on business travels with over 5% of their total cost linked to travel activity. Whether these travels are done to the country where the headquarters is located is not answered, but if so it would mean that there is a large share of individual knowledge carriers, or the Saxenian term “Argonauts”, to transfer skills and know-how through face-to-face contact.

In the shipping industry, cooperation with other firms is a necessity, and this involves a fair amount of interaction with other maritime organizations and shipping companies. Strong



relations with customers are maybe the most important relationship for the development of new services and solutions and it gives a greater opportunity to take advantage of the maritime cluster. As the Norwegian shipping companies have global market contacts, strong relationships with demanding customers is assumed to be important for innovation, maybe the most important in the shipping sector. (Jensen, 2003, pp. 97-99) Interaction with clients in a direct manner is of importance as Barwil/Unitor sees the people behind their products and services as important for the total perception of the company value. Several incentives have been made to increase and enhance the meeting activity between the Norwegian companies, and at the time the interview was made, Mr. Tønsberg also held chair in the NBAS, Norwegian Business Association in Singapore. One example on how informal networks or meeting places is important, especially for Norwegian companies to interact in a foreign location. There are several initiatives which seek to create networks where representatives from companies may meet to exchange information, and it is assumed that this also happens in more informal networks as well. NBAS was established in 1993 as a forum for exchanging knowledge and information and creating professional networks which again can foster trust. Through these tools meeting places such as the ones NBAS facilitates with a monthly lunch and a gathering every week with a relevant lecture creates new ways of thinking between the agents and plays an important role in innovation. Measuring innovation in this context is problematic as a local buzz of innovation is a rather vague concept. A majority of innovation research uses R&D-spending and productivity as measuring tools for innovative capability.

It is probable that most of the R&D based companies are those within the ship industry, and the majority of 79 % uses between two and five percent of their cost on developing and researching new products and processes. Unitor/Wilhelmsen has representation through various segments of the cluster, but operating mainly as a ship owner this company also has

their own R&D activity. As a company in need of optimizing their processes this is throughout the whole organization, making it difficult to quantify, but these activities is mainly done at the firm's headquarters in Oslo which is representative for the companies in general as well. On the other side there is a significant share of firms (31 %) which conduct their research and development in Singapore, illustrating that many firms may tend to pool the resources of their specific location.

Given the many different ways of identifying clusters, one can always encounter criticism of the findings due to unspecified or unmeasured cluster boundaries. Supporting or rejecting clusters in a definite manner based on the empirical material is more or less impossible, as cluster critics sees so many "ambiguities, identification problems, exceptions and extraneous factors" which interferes in the clear conception. (Martin and Sunley, 2003, p. 23)

However, the role of easy access is not facilitated through for instance the broadband width, and access to information is still essential for the firm-based innovation process. Proximity, supply and technological linkages, and the existence of repeated personal relationships and community foster trust, which again facilitates the information flow. Obtaining information related to sophisticated buying needs is one benefit of operating in a cluster as other participants often have information about these buying needs. (Porter, 2000, p. 22) Access to institutions and public goods is also essential in the motivations for operating within a certain cluster. Firms can often access specialized infrastructure and advice from local expertise at a very low cost. Likewise there are mutual benefits for the public institutions as well, as the information built up in a cluster can be seen as a public good.

Location shapes the trade offs between markets and hierarchies. It offers transaction cost advantages over other forms and seems to eliminate incentive problems. Interaction and

the informality of face-to-face contact resulting from living and working in the same area provides trust and open communication, while reducing the severing costs and recombining market relationships. (p. 25)

## 5.2 How can institutions enhance innovation in clusters?

This section will first look at two specific organizations which operates in their respective clusters with a motivation to enhance these innovative processes through the factors which Porter claims will enhance productivity in a cluster. Furthermore and just as important, how do the companies perceive these initiatives, and are they important for remaining in their cluster abroad? Comparing two initiatives of this kind will provide the basis for some suggestions of policy implications. The OECD (1999, 2001) sees innovative clusters as drivers of national economic growth and a policy tool for boosting competitiveness. In the “knowledge economy” it is argued that the leadership of the US in this new economy is a result of innovative clusters of individual entrepreneurialism. (Martin and Sunley, 2003, p. 6) This paper has on the other hand included critical elements regarding whether this cluster “outfit” may explain regional economic activity and how policymakers may take action using their innovation enhancing tools.

Oslo Technopole and Oslo Maritime Network are governmental initiatives started by the minister of local- and regional government at the time, Erna Solberg (2001-2005). The organization had its origins in the Big City Project which was created for large populated regions to provide ideas to pilot- and innovation projects with the ultimate goal of making Norway one of the most innovative countries by 2010. As a reply from the region of Oslo, “The Capitol Project” was initiated by identifying five economical clusters which were considered the main driving forces of the regional economy. The maritime cluster were one

of the clusters identified to be important to the Oslo region, and is considered the most important in terms of size and strength. The primary task concerning the sector was to survey what happened in the region and what should happen to attract and create more activity. Once in dialog with various agents such as ship owner Moritz Skaugen and interest organizations like the Norwegian Ship Owner Association (Rederiforbundet) they started shaping a hypothesis that the Oslo region was poorly organized and characterized by linear relationships. One firm had for instance ITS customers, ITS suppliers and a fixed social network they related to. Oslo Technopole and Maritime Network identified through this that their core activity was to be related to network building and cluster development.

There are several tasks to be achieved for this organization to reach their goal, and several tools are utilized in the development of the cluster. The main responsibility for Oslo Technopole is to provide information about the innovation system in the region in establishing firms, financing, trends and statistics about the economic life which is relevant for those considering establishing. Further on the mission of the organization is to develop the knowledge and competence in the region so that Technopole will be the natural co-player in the advancement of innovation in the region of Oslo.

Compared to the resources of Management Port Authority in Singapore, the received resources for the neutral innovation facilitator in Oslo are rather small. The owner of the organization is the municipality of Oslo which provides two full time positions. Furthermore, Oslo Technopole received funding from Innovation Norway in order to do various surveys of the region. Knut Halvorsen in Oslo Technopole expects that the funding will increase with time, but that this will largely come from private agents unless there are concrete projects in public interest.

If we turn back time for a brief moment we remember Porter's six characteristics of a successful cluster and try to find correlations between these factors and how Oslo Technopole tries to enhance and develop the cluster. (Porter, 2000, pp. 31-32)

*A shared understanding of competitiveness and the role of clusters in competitive advantage.*

Understanding the factors that affects competitiveness through communication and debate are important tasks, especially for the Maritime Network. The first task of the initiative was to gather representatives from the various fragments of the cluster that existed in the region from firms to research institutions and universities, except ship builders which are currently not located in the region. The participants of the Maritime Network again had their own networks with their respective resources and knowledge, together they identified four areas of focus for the cluster; - technical- and service related innovation – capital, - commercialization of businesses and –competence, through maritime education.

*A structure embracing clusters within a nation, state or region:* As noted earlier, Oslo Technopole in its starting phase identified five important industries or clusters to be focused upon regarding development and innovation enhancement. Porter finds this proactive strategy not quite fortunate, since a characteristic of successful cluster initiatives also includes declining clusters. However in the perspective of the resources the organization disposes this limitation of cluster entities was probably the only option, but if the Oslo Technopole or a similar organization would receive more funding for projects in this aspect should be on their agenda.

The five emerging or existing clusters (maritime, energy and environment, ICT, biotech, culture) have all local foundations in the region and have passed a certain market test as the products and services from these clusters meets a demand both locally and globally.

*Appropriate cluster boundaries;* as the definition includes industries and institutions with important linkages and spillovers, these boundaries should reflect economic reality, not

necessarily political boundaries. In the specific cases of the paper, the author has done so, as he treats Singapore as a region, though in fact it is a nation state. In the case of the Oslo region it is a bit more intricate as the maritime cluster receives important spillovers from the fishery cluster and the offshore cluster, respectively located at the north-west and west coast of Norway. In the enhancement of the productivity of the maritime cluster of Oslo including these outside elements is to some extent important, but the geographical distance could pose several challenges since proximity enhances trust and communication.

*Wide involvement of cluster participants and associated institutions:* Initiatives should include all firms and institutions of all sizes; Technopole stressed this when establishing Maritime Network and included a nearly complete cluster in the dialogue for increasing the productivity of the sector. Whether it included small entities as well is another question and it seems as the initiatives first hand gathered only the heaviest institutions and companies. As a response to the initiatives Oslo Technopole experienced ease in involving participants during Norshipping, a yearly conference for shipping companies, and a general awareness from the segments of the cluster that these forums could be beneficial in bringing out latent ideas in the interaction with others.

*Private sector leadership.* Private firms are normally more qualified to identify possibilities and obstacles in innovation and productivity together with a better implementation strategy than public institutions. In this matter Oslo Technopole sees itself only as a neutral fertilizer where the important task is to gather the relevant entities. On the other hand if we look the maritime sector today they need to adapt to changes provided by governmental decisions such as tax, a current issue in the economical policies for the shipping sector. In the various dialogue-initiatives of Oslo Technopole it is most likely that the private sector is using these forums to express their interest to bodies of ruling and research.

*Close attention to personal relationships*; as this is highly relevant to the analysis of the relevant institutions of this paper because emerging clusters does not guarantee functioning linkages. “The benefits of clusters flow from personal relationships that facilitate linkages, foster open communication, and build trust” (Porter, 2000, p. 32). As mentioned earlier, information and education is essential to productivity and if this is easily transmitted it will strengthen the cluster and endure even after a project has ended. If trust or the flow of information is lacking, neutral facilitators may help to redevelop these relationships. It is important that these successes should be widely publicized to create awareness of the industrial strength of the region. The Maritime Network experiences results when gathering participators, one example during a meeting where BI, a college in Oslo for specialization in economics and shipping were in dialogue with Nordea, a financial institution operating a heavy branch in shipping financing. This particular meeting resulted in the awareness that students from BI did not have sufficient competence after an employment with Nordea, the bank needed to provide additional competence before they could perform a function. The result of this problem identification was a renewal and adjustments of the shipping program for BI so that their students are fully prepared for the step into the professional life.

There is a strong awareness in the organization Technopole that face-to-face contact fosters trust, both between the different cluster representatives, but also a trust in the fact that a public organization can provide solutions by gathering for example local politicians and ship owners which was one of the primary initiatives from Oslo Technopole and Maritime Network. The next stages are now a further strengthening between education and demanded competence, and as a neutral facilitator with no commercial motives the right people from the appropriate organizations, for instance Torger Reve from BI, were willing to meet. One result from these meetings was a strengthening of the maritime program in Norway, similar to the BI program in Singapore, which at this time is one of the preferred in its kind.

Obviously creating this competence in Oslo is of great importance for the involved actors ranging from the private entities to the research institutions, something which the coordinators behind the maritime network are hoping to achieve.

Given the importance of publishing results from clusters and enhancements processes Technopole has obstacles to deal with as they experience that everyone involved in shipping abroad are aware of the Oslo cluster and its strength, but the awareness among the local residents and politicians about the cluster is significantly lower. To meet this challenge Technopole has joined forces with Menon, a strategic advising company to survey and identify the maritime economy of the Oslo region. This report addresses Norway as the main country due to the necessity for information about the local cluster.

The perception of competition and the future for the maritime cluster of Oslo in the eyes of Oslo Technopole can be characterized as reflected regarding potential threats, but there is also a vision of mutual benefits and a potential cooperation between the two maritime clusters.

The steps Norwegian authorities are not willing to take will give clusters in other countries, such as Singapore, advantages. The national shipping cluster of Norway is as noted very geographically dispersed and different strategies are needed in enhancing innovation and productivity, something which Singapore does not experience as a more homogenous entity.

Halvorsen sees cluster enhancement as a bold strategy especially in a Norwegian context. "Picking winners" as they do in Singapore has for a long time been criticized, as Norwegian economic policy is characterized as being business neutral illustrated through similar external conditions and taxation. In the Singaporean proactive policy the risks are widely spread to sixteen clusters with specific resources and funding to each one, and comparing to Norwegian policies they have come some steps further. Compared to MPA,



Oslo Technopole receives around 15 million NOK in governmental funding each year, which is significantly less than their Singaporean sister-organization.

The funding for the Technopole projects are increasing, but only with around one million each year. A large increase could interrupt with the organization's flexibility and their desire is to grow with their network strategy, not wanting to have more than twenty employees. Halvorsen sees that the MPA may encounter difficulties due to the large size of the organization with several hundred employees and its hierarchical structure. Furthermore Singapore in its economical history has been dependent of industry and manufacturing, but a current strategy is to develop their knowledge economy with the Norwegian maritime cluster of competence as one influence.

As they perhaps may be morally obliged, the regional innovation facilitator in Oslo believes the future is strong for the maritime cluster of Oslo. The fact is that a potential exodus of maritime firms has still not taken part or showing signs of it, though the consequences of the recent tax demand from the Norwegian authorities of 21 billion NOK may be a factor of uncertain conditions which may eventually drive out ship owners and their suppliers. An important characteristic of the cluster today is that has a heavy representation of ship owners, headquarters and R&D, illustrating the role of knowledge and competence in the cluster.

As it is for the moment the ship owners have their most vital business networks located in Norway, even if its not easily identified since it is embedded in tacit knowledge, networks, history and culture. Moritz Skaugen, as an example has all their operative capacity abroad, but the management team of the ship owner is located in Norway as Skaugen feels the foundations for strategic decisions are much better in Norway because of the competence environment. Another similar example on the strength in competence of the region is

Bergesen. When Worldwide obtained ownership renaming it Bergesen Worldwide, the only relocation which took part was moving the container traffic out of Oslo and replaced it with their gas-and offshore activities. The result of this is that the offshore related activities of Bergesen Worldwide are much larger than the previous activities of Bergesen in Oslo.

As Porter emphasizes the importance of private leadership in a successful cluster their reflections of the future of the Oslo cluster is as, or maybe more important, in shaping policy for competitiveness and innovation for the maritime sector. Bjørn Tønsberg immediate response to the future of the Oslo cluster is like many of the other shipping companies figuring in media and stressing the importance of stabile conditions especially related to taxation in order to have a business friendly environment. At the time of the interview with Tønsberg, the new Norwegian tax arrangements similar to EU-level had not yet been introduced. He sees the motivations provided by the Singaporean government and MPA as a fruitful combination between firm interest and the national interest of Singapore, and assumes that Norwegian companies only will increase their activity on the island. The maritime hub of Singapore will grow stronger which will lead to a relocation of complementary firms following their clients.

The conditions offered by Singaporean government is quite different than what the shipowners meet in Norway, and another important question is to see the role of public innovation fertilizers, how the firms evaluate the support they receive and if this has been a motivation for relocating.

**Is your company satisfied with the terms of conditions provided by the Singaporean authorities?**

Alternatives	Percent	Value
1 Not satisfied	0,0 %	0
2 Partly satisfied	8,0 %	2
3 Satisfied	44,0 %	11

4	Very satisfied	40,0 %	10
5	Don't know	8,0 %	2
Total			25

The Norwegian maritime firms in Singapore experience the role of the local government in different ways, but in total they are highly satisfied with the terms of condition offered by the Singaporeans. (See Appendix. Survey results.)

**Is your company satisfied with the contribution from Regional innovation enhancing actors, such as International Enterprise or Port Management Authority etc.?**

Alternatives	Percent	Value
1 Not satisfied	4,0 %	1
2 Partly satisfied	4,0 %	1
3 Satisfied	32,0 %	8
4 Very satisfied	16,0 %	4
5 Don't know	44,0 %	11
Total		25

Similar findings can be interpreted out of these data, what comes as a surprise here is the large amount of firms are either unaware of regional enhancing actors or the reason for this is the misspelling mentioned in the methodology section. In explaining the conditions on how these organisations facilitated and fertilized innovations in their companies other than creating a competitive business environment, the companies point out several factors. They companies themselves identified a critical mass of companies relocating to Singapore followed by the supporting competence of the services and business elements, not corresponding with how Oslo Maritime Network observed the development. More specifically the companies saw support from the public institutions through incentives of cooperation between equipment suppliers and wharfs in developing optimal technological solutions as important. Three other firms emphasize activities for conferences and networking which allowed further

development. The role of the Maritime Port Authority operating on behalf of the Ministry of Transport is characterized by one of the companies as being “extremely active in building up a full knowledge-based shipping cluster with good incentives” They have moved from a policy of flag convenience as it was in the seventies and eighties to become a promoter of quality companies. This might be illustrated by the strong growth in presence of Norwegians in Singapore from around 600 in 2002 to 1200 today. Many of these are shipping executives with good experience and instead of transferring their knowledge to younger Norwegians; they transfer their know-how to Singaporeans. The proactive policies through the MPA are one reason for many companies to change to Singaporean flag.

The Norwegian maritime companies seem to be conscious about the relocation problem. The cluster in the motherland is something still worth protecting; something which the companies wish to do as well, but this well-meaning can not be transferred that easy to the real business world. The innovative capacity of rig building in Singapore together with the Norwegian offshore competence has clearly been an important factor in establishing Singapore as an important maritime hub, not only due to its proximity to Asian markets as there are obviously incentives in being a part of a Singaporean knowledge cluster.

From this perspective Norwegian cluster fertilizers clearly have a long way to go. The feedback from the companies located in the Oslo region to Oslo Technopole and the Maritime Network is a sort of gratefulness since they have never received help like this before, even if the amount of help actually given has been modest, it is of no cost to the companies. However, the companies have wanted some more operational resources to organize more gatherings from the maritime network and the organization wished they knew the business more from the inside. Nevertheless, by using modest tools such as creating meeting places which circulates between different firms and institutions provides foundations for activating the cluster, something which firms appreciate, hence most likely finding new

combinations in the search for new ideas. However, the Oslo cluster has obstacles to overcome within private sector leadership and publishing results and projects, creating a stronger public awareness. The sector is too important for the region, as it contributes to the creation of employment, generate revenues and one of the cardinal points, they pay their taxes here. The next step for the cluster enhancement is to create a public awareness about these elements, together with the role of local research and development in maritime projects so that there is a sentiment about its role and importance. One question that needs to be raised is whether this offensive towards cluster thinking finally is dependant on the terms of conditions provided by the Norwegian authorities.

Head of Oslo Maritime Network, Kevin Gallagher is also aware of the role of taxation of ship owners. Unstable conditions given by the Norwegian authorities may lead to a further relocation of the maritime companies and the ship owners, especially the vital headquarters in their role as knowledge generators. On the other hand the threat of variation in tax policy has up to this point not been a sole incentive for moving abroad, suggesting that the competence base is still of vital importance of the competitiveness for the firms thus obviously goes beyond tax incentives.

As a high-cost country Norway must differentiate in the localized competence and know-how as for many other knowledge economies in this era of new globalization patterns. The evidence for these new strategies are not clearly seen at the moment in Norwegian research policy as the country has the lowest share of its GDP spent on research, (Aftenposten, de Lange, 2.10.2007) but some initiatives are taking part especially related to maritime research under the direction of the Norwegian Research Council through their project MAROFF. This project has experienced a large growth in funding, and through their ambitions to realize the governmental goals in maritime development and strengthening innovation and value creation for the maritime businesses. The target groups for these

initiatives are shipping- wharf- and equipment suppliers, the technology and research intensive fragments of the maritime cluster. (forskningsradet.no) Oslo Technopole desires more governmental initiatives like this as it could result in a clearer perception from private firms that public institutions sees its future possibilities and also serving as an example.

This section has identified some strengths and weaknesses in the maritime clusters of both Oslo and Singapore and their role in a global competition. The evolutionary perspective obliges us to see if there could be a beneficial interaction between these entities, in not seeing global competition as a zero-sum game. As mentioned the Norwegian cluster is claimed to have their competitive advantage in their core knowledge base created through a long standing history of shipping activity, whereas the Singaporean cluster is superior in areas related to production, manufacturing, tax incentives and proximity to Asian markets. Oslo Maritime Network points out that there is also a substantial amount of cooperation between the clusters and it has similarities to a global cluster, where they compete where they have to and cooperate where they must, similar to many firms within a specific, regional cluster. Again using the example of the ship owner M. Skaugen which as many of the others feels that the proactive policies of the Singaporean authorities stimulates their business on the contrary to what many feels when operating from Norway. On the other hand Skaugen is not relocating their strategic departments (i.e. headquarters), as they mean that the Oslo cluster provides the best competence and knowledge for their decision-making. When most of the operative capacity is located in Singapore, this means that all parties are gaining on this differentiation, resulting in a milieu of trust and cooperation between the clusters. In 2006 Norway, China and Singapore announced an agreement of cooperation within maritime research, development and education, to illustrate this point. (Hegnaronline 20.9.2006) Even if Singapore may be characterized to be more consequent, long-term and picking winners to a larger extent through specific sectors or persons, this may ultimately lead to a cluster with a

higher competitive advantage. In this context one aspect is the long term development of the Norwegian cluster which has taken closer to 150 years, and it is obvious even for ambitious Singaporeans that this is not achieved in a time frame of for example 20 years. Gallagher believes that this relationship will continue to be both fruitful and complimentary, but predicting the future in longer terms may show that the knowledge intensive elements relocates to a larger extent, one development the Norwegian cluster fertilizers are aware of.

## 6.0 Discussion of the empirical findings

One of the main aspects of this paper has been to identify evolutionary aspects within contemporary cluster theories and to find out what motivates companies within a specific economic sector to locate in the same regions. Firms locate due to the interaction between entities and in geographical proximity this facilitates the flow of tacit knowledge which is crucial to innovation. The aspect in evolutionary economics regarding adaption is to a large extent based on tacit knowledge and the shared values and understanding. The systemic character and the role of institutions is also important, since it determines the firms selection criteria and in some cases the policies of f. ex the Singaporean government stimulates Norwegian firms to relocate or expand their business on the island. Applying an evolutionary perspective to the geography of economics has the ability of scoping through time and space together with the preoccupation of the long-term evolution of the economic system in terms of dynamics and stability. (Boschma and Laaboy, 1999, p. 412) Further, the boundaries of clusters continually evolve as new firms and industries emerge while others decline as institutions develop and change as well. (Porter, 2000, p. 18) By having this cross cluster interaction, the interaction facilitates access to the respective knowledge pools of the clusters, attaining a competitive advantage benefiting from the differentiated capabilities of the two regions. The criteria of a low cost exchange between the two vibrant clusters seem to be met, and the benefits of this exchange are benefits for both. In both clusters, they perform an outcome in the selection process, and do not path-dependently reproduce themselves.

To answer a debated issue as to whether a potential exodus of Norwegian companies represents a threat to the national economy, some factors are calming. Norwegian companies in general still want to have their headquarters located in Norway, at least as long as the conditions are predictable. A location in Singapore is mostly motivated by market proximity,



while the proactive conditions provided by the Singaporean authorities is something which can be regarded as a bonus, and a motivation for the firms is to tap into the local knowledge pools to transfer them back to the mother-office, something which Cantwell defined as an “innovation winner”, pooling the most optimal knowledge from specific locations. This is underlined by the fact that the changes in Norwegian taxation policies towards the maritime sector in the 1980’s did not create a mass relocation of shipping companies to Singapore. Furthermore the term “global shipping cluster” must not be underestimated, as this could be understood as a positive sum game. There is a large degree of cooperation between the clusters, and their respective differentiated capabilities are within different areas. These spillovers effects can be regarded as positive, in a utilitarian sense, to the world economy, even if some actors as the Oslo cluster, may loose ground in the long run of the economic development.

There are many signs of evolutionary thinking in cluster theories, especially the systemic character where the different entities interact to create innovation and competitiveness, especially the interaction of a social kind which creates trust and facilitates the flow of tacit knowledge. What Porter is lacking in his theories is the role of historical development, something emphasized in evolutionary economics and the role of the social networks in this process is to some degree under-theorized, though he does right in focusing on the systemic nature of innovation processes. Porter argues that the social embeddedness through the existence of facilitative social networks and social capital is crucial for the functioning and upgrading of clusters. These claims have remained as a “black box” in Porter’s work, and hopefully this paper has through its focus on face-to-face contact in innovation processes enlightened this box to some extent. Social interaction and face-to-face contact is particularly important in the maritime sector, since it is in an environment where the information is imperfect, rapidly changing and not easily codified.

The role of institutions in enhancing innovation processes has been the second question this paper has tried to focus upon. In this case, Oslo Technopole plays the role as the last building block in a functioning and successful cluster by “facilitating cluster development and upgrading”. When Oslo Technopole sees their role it is obvious to see that they are influenced by cluster thinking and which tools to utilize to enhance innovation and productivity in a cluster, especially through promoting results and creating social networks. But compared to the Singaporean initiatives, both in time existed and resources received in stimulating the competitive diamond, there is still a long road to go. The maritime firms in Singapore seem to be more aware of the cluster benefits localized there, maritime research receives more funding and the cooperation between firms and institutions appears to be more solid and frequent than the slightly sporadically interactions in the Oslo-region.

#### 6.1 Review of the findings in the light of earlier literature

The analysis from Reve and Jakobsen identified both strengths and weaknesses in the Norwegian cluster when it was conducted eight years ago. The strengths pointed out by the authors regarded the Norwegian cluster as a whole, something which this paper has not. The advantage of a complete Norwegian cluster must in this case be left aside, since there are no shipbuilding facilities in the Oslo region. Though, except for that issue, the cluster around the Oslo-fjord is complete. The second point referred to the strong linkages to other sectors of the national economy and since this paper has narrowed its perspective to one sector which certainly is a limitation it is difficult to say whether these linkages have improved. On the other hand, by looking at the regional economy of Oslo, the sector plays an important role in generating revenues, and hence it is natural to assume that they have strong relations to suppliers, but whether this has improved through time is another issue. The third issue related

to the strengths as a result of the historical processes. Since eight years have passed since the analysis this is too short a period given the perspective that the cluster has existed for around 150 years. The last strength of the cluster is the tight network of knowledge linkages. This paper has tried to show that these linkages might have become stronger with the efforts of Oslo Technopole, but then on the other hand, since then some companies have moved their activity from the region. The establishment of companies in Singapore has been particularly strong the last years, especially related to rig and offshore and it is natural to believe that some of these elements were located in Norway or Oslo prior to the relocation and that the relocating perhaps has weakened the knowledge networks.

What is more important in this context is how the sector has responded to the challenges they were facing slightly less than a decade ago. First, there were signs of path dependency that there was a lacking appetite for technical and commercial innovation. For the technical part there have been some initiatives like the mentioned MAROFF project and funding for maritime research has been ongoing the passed years, something which may indicate that this warning to some extent has been taken notice of, though there are some policy issues remaining to strengthen maritime research. Commercial innovation on the other hand is often not a result of intended search as R&D is. Oslo Technopole was a result of a governmental initiative, and through their efforts in creating social networks this has hopefully facilitated to the spread of tacit knowledge which enhances innovation, especially related to service and commercial elements. Another threat predicted was the danger of losing competence of the labor stock with a shrinking number of sailors and dock-workers. The Norwegian Ship Owner Association launched last year the “Ikke for alle” (Not for everybody)-campaign to strengthen the recruitment to maritime colleges. The newly established (1999) shipping department at the BI economical college has the aim of recruiting and educating candidates for the service sector in shipping, a department which has

participated in the Oslo Maritime Network. (bi.no) The tendency towards a more globalized economy shows indications that there has been a shift in Norwegian from individual ship-owners to new structures of ownership, and these new ownership structures could alter the localization of companies. In the case of Bergesen Worldwide, it illustrated that even with changing ownership structures; some restructuring could change for the better, as the role of offshore knowledge and know-how was a determining factor to locate this division of the multinational company in Oslo.

Finally, the study from Reve and Jakobsen showed that there was little cooperation in areas such as R&D, and only 32% of the ship industry and 12% of the shipping companies were in close contact with research institutions. The cooperation that took place often related to improving the terms of conditions for the sector in general. The ongoing debate of tax policies and tax debt might give indications that there is a status-quo when it comes to working together, and that this perhaps is overshadowing other aspects of cooperation. The growing role of the Oslo Maritime Network might be a tool to improve interaction, especially on the role of enhancing service- and process innovation.

What do these finding imply for the current theories which are included in this paper? First, it has tried to identify evolutionary tendencies in contemporary cluster thinking, and what lack is an emphasis or explaining social networks in practice and the importance of proximity in spreading tacit knowledge. It remains as a “black box” in Porter’s thinking, and although he acknowledges the importance of it, his theories to be fully systemic, lacks the role of historical development, a development important for the characteristics of the two clusters. Porters cluster thinking should not be accepted on faith alone, represents meaningful tool to illustrate the systemic nature of an innovation system, though the author acknowledges some of its critics that cluster theory should be able to specify a priori how different clusters develops different under their various conditions.

As to the role of institutions from a bottom-up perspective from Singapore, there are clear signs of institutions shaping economic coordination and to some extent the identity of the agents operating in the environment. In a Norwegian perspective, viewed top-down, there is a notion that the organization contributes in the innovation process on the background of positive feedbacks on the interaction facilitated by Oslo Technopole. There are no large implications for the innovation system-theories included. In the section where the findings are overviewed, there are some additional reflections on how the role of an innovation enhancing organization is corresponding to current theories.

## 6.2 Limitations

Some methodological issues related to analyzing how firms cluster in Singapore from a bottom-up perspective to the Oslo cluster, where the analysis was based on an innovation enhancing agent, or top-down. The most preferable would have been to apply these perspectives to one cluster for a more complete understanding. However, in the light of globalization and the aspect of a shipowner translocation from Norway, this perspective was found more appropriate. Furthermore, with the limitation pertaining to the length of the paper it would not have been possible to do an analysis of both clusters.

This paper has included some critic on the limitations of the cluster perspective. Martin and Sunley (2003) saw the cluster perspective as a policy panacea and the explanation and analysis of cluster cases reduced to a best-fit exercise. They claimed that much of the evidence was based on success stories, and few studies could document the importance of clustering in particular industries or comparing similar firms inside and outside clusters. (Martin and Sunley.2003, p. 22) This paper has to some extent been based on a success story

as it has looked at the emergence of the Singapore Maritime cluster, and due to lack of quantitative data material, the documentation of firm performance is limited.

The evolutionary approach tries to see the systemic character of an economy. In this case narrowing down to one sector might overlook vital spillover-effects from other sectors of the economy, also on a national level which might strengthen a regional economy as well. The maritime, industrial competence has been one of the pillars in the development of Norwegian offshore technology. The knowledge based in this sector is to an extent based on this, though this paper will not include the role of the development of offshore related technology, the author sees that it has played a protagonist part in creating the knowledge advantage of the maritime sector. This is mainly due to the length of the paper, which is narrowed down to the role of the shipping sector. Reve et al looks at the Norwegian maritime cluster in a sense that they are within the sector, as this paper will look at the role of regions and geographical clusters, the paper differentiates to a certain degree from the Reve analysis.

### 6.3 Policy implications

Strengthening the competitiveness in a cluster is definitely beyond tax incentives. The contemporary debate regarding the Norwegian shipping sector indicates something else, but there is more to stimulating the sector. A majority of the ship owners, maritime companies and their interest organization, the Norwegian Ship Owner Association called for stable terms of conditions. The gathering of data was conducted prior to the governmental decision of the ship-owner payment of tax debts. This announcement also included that the future tax level would be similar to that of the EU, meeting the interests of the ship owners.

However, since the paper has tried to see beyond tax incentives for the companies to operate in Norway, the role of knowledge creation must be emphasized in the policy making of the decision makers.

1/3 of the Norwegian maritime firms in Singapore pool their knowledge resources from the same location, but at the same time the data showed the quantity of headquarters located in Norway as an arena for strategic decisions. It is important that the headquarters remain in Norway, even if the majority of the operational capacity is located abroad. It is unavoidable not to include tax incentives, and it is strongly recommended that it is not altered anymore so that the ship owners can feel safe that the conditions will remain stable in the future, as they are interested in maintaining the knowledge base in the Oslo region. Important is the stimulation of interaction between the fragments of the shipping sector in the Oslo-cluster. This interaction creates innovations as it has done throughout history, and it is important that agents such as Oslo Technopole and their maritime network continues to exist and gradually receives more resources as the companies respond positively to their facilitation of social interaction. Private-, not public leadership is one characteristic of a successful cluster, hence the implications for the policy role must only be to facilitate, not dictate.

As social interaction leads to trust and the unintended search of knowledge, the more intended version is through research and development. As for the research policy generally in Norway, many advocate an increase in the share of research funding. There is already a substantial share, mostly related to offshore research. In this area it is advisable that the Singaporean example should be followed with offensive policies and maritime technology and innovation. As a high-cost country, on the other hand, Norway should still differentiate through the existing knowledge base, and attract foreign companies and external knowledge.

The main factor in advising for policy implications relates to a larger framework than specific activities within the sector. The issue is whether Norwegian policy makers should

make priority of the sector which would indicate a more proactive role in their economic policies. However, the tradition has been a more neutral role in the shaping of these policies and would mean a change of direction. Some tendencies of “picking winners” are already visible, and the project behind Oslo Technopole was one of these as it was to identify the most promising sectors of business in the Oslo region. On the other hand, neutral policies of stimulating the economy as a whole is advised through the contemporary cluster theories, but given the fact that the maritime cluster of Oslo is extremely important when it comes to employment and the creation of value and knowledge as it generates high profits and attracts knowledge- and technology-intensive firms and institutions, the authorities should to some extent stimulate this particular sector through stable terms of condition, research and the facilitation of social interaction.

#### 6.4 Recommendations for future research

Looking at the limitations of this paper many recommendations for future research comes forward. As this paper has been fragmented between a Singaporean bottom-up perspective and a Norwegian top-down analysis, some research, which includes both perspectives to one cluster, is recommendable. This will hopefully answer to a larger extent what the cluster motivations for firms are, and how institutions in the same cluster can enhance productivity and innovation. In terms of innovation, this is easier to measure through quantifiable data as it relates directly to firm performance, another perspective for a future study.

Almost ten years has passed since Reve conducted his study on the Norwegian maritime cluster. During this period the conditions has undoubtedly changed regarding location desires and structure of shipping sector as a whole. Furthermore, his analysis



included the Norwegian maritime cluster as a whole, including spillovers from different sectors and all regions such as the northwestern and western coast.

A similar study of the situation today could be beneficial for the comprehension of the sector's situation today.

The Singaporean case has been analyzed in this paper in a limited manner, due to the length of the paper and the ESST criteria of a European perspective. The emergence of the cluster in Singapore can be analyzed through a variety of academic disciplines, something which has been to a large extent. However, since the previous open flag policies Singapore has changed a lot of the dynamics in their shipping cluster, especially related to the emergence of the role of knowledge as a regional competitive advantage. A study, which emphasizes the change from a manufacturing to a knowledge economy, could be interesting for future research.

Given the important role of the Norwegian shipping sector and its transition due to changing economic patterns, the author is convinced that the amount of research on the sector will remain high. Only the future will show the results of various policies and location motivation for the Norwegian maritime cluster. As it has played an important role in Norwegian transport and value creation for several hundred years, it will most definitely do so in the future as well. The question is where.

## 7.0 Conclusions

The goal of this paper has been to explain motivations for clustering in a bottom-up and a top-down perspective. In explaining the first, the cluster motivations Norwegian maritime firms located in Singapore have been analyzed. Secondly, to shed a light on the top-down perspective, the focus has been on Oslo Technopole, an organization which sees its own role as an innovation enhancing agent in the Oslo region.

The theoretical viewpoints included to study this phenomenon have been within evolutionary economics, as it sees interaction between entities as vital for growth and innovation. Furthermore, it is a fruitful perspective which has dynamics as its methodological imperative, as well as it includes historical development, important when including role of shipping in the Norwegian and Singaporean economy in a historical role. However, regarding the perspective on the regionalization of economies from policymakers and lay-people, contemporary cluster theories (Porter) are more suitable in explaining this trend of the growing importance of the local economies in a globalised world.

There are several evolutionary elements in Porters definitions of regional clusters, especially related to the role of social networks in creating trust and facilitating the flow of tacit knowledge, crucial to innovation. On the other hand, this interaction is not thoroughly explained in contemporary theories and they not include the role of historical development, something very important in explaining the growth and role of the maritime clusters in Oslo and Singapore.

The motivations for maritime firms in operating in a specific location are not only related to aspects such as low-cost or market proximity, important is also an attractive and dynamic cluster in terms of the facilitated acquisition of knowledge to optimize processes and services.

The role of innovation enhancing agents in this process is also of great importance, as it can stimulate the interaction between the various entities of a cluster, through creating trust and social networks. Oslo Technopole and their Maritime Network apparently sees the same tools as Porter in the characteristics of successful cluster, especially related to face-to-face contact and publishing the success stories of the cluster. However, the organization is at a starting point, and can not match the MPA in Singapore in resources or time existed.

Whether this calls for a proactive policy of picking winner sectors or that it should imply a more economically neutral policy is left up to the reader to decide, and the paper tries to argue for *pros* and *cons* for both policy strategies.

Given the attention to the situation of the shipping sector in Norway today in media regarding the terms of conditions for the shipowners, it has been unavoidable to ignore this when discussing policy implications. The shipowners themselves are interested in maintaining the knowledge-based cluster in the Oslo-region, but not at any given price. The majority of Norwegian shipowners are located in Oslo, together with their service suppliers and they need further stimulation which goes beyond tax incentives if they are to remain in the region. The role of institutions such as Oslo Technopole is important as it has the ability to enhance the knowledge advantage of the region through their role as a neutral facilitator, bringing together the fragments of the cluster.

The consequences of the latest governmental decision related to the tax regime for shipowners are too early to predict. What this paper has tried to shed light on is that there are more factors than tax to stimulate the international competitiveness for Norwegian shipping. As for now, there are indications of an existing global, maritime cluster with more cooperation than competition between Norway and Singapore. What there is no doubt about is the importance of keeping the headquarters of the shipowners in the region as they are the centre point of the maritime cluster, their strategic decisions are done in these main offices

and they attract suppliers vital to the research and development of Norwegian-based technology.

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## **Appendix**

### Appendix I: List of abbreviations

MPA, Maritime and Port Authority of Singapore

EDB, Economic Development Board

NBAS, Norwegian Business Association in Singapore

STS, Science and Technology Studies

### Appendix II: List of interviewees

Oslo Tecnopole/Oslo Maritime Network. Knut Halvorsen and Kevin Gallagher

Barwil/Unitor, Wilh. Wilhelmsen, NBAS, Bjørn Tønsberg

### Appendix III: Interview guide

#### 1) Innovation enhancing institutions

##### **Norway**

Oslo Teknopol

Maritimt Forum

##### **Singapore**

Maritime and Port Authority of Singapore

- Can you briefly tell me about your organisation?
- When was it founded?
- What is your goal/core values
- What/who are your sources of financing?
- The development of this financing, has it increased or increased?
  
- Which means/policies do you utilize to enhance innovation within the shipping cluster of your region?
- How much of your organizations resources are spent on this sector?
- Do you consider it to be an important part of your organizations work?
- Why?
- Do you have any reflections of the future of the maritime cluster of your region
- What can be done to prevent threats/enhance strengths from your organisation?
- Additional comments

#### 2) Interview guide Bjørn Tønsberg

Relatert til Norwegian Business Assosiation Singapore

- Fortell kort om organisasjonen? Hensikt. Historie. Målsetning.
- Anser du denne organisasjonen for å en rolle i å fremheve innovasjon? Hvordan?
- Arrangerer dere mange møter/treff, hvor ansikt til ansikt kontakt er viktig?

Relatert til Unitor/Wilh. Wilhelmsen virksomhet i Singapore

- Kort om selskapet Wilhelmsen/Unitor?
- Når ble deres virksomhet etablert i Singapore?
- Kan du fortelle litt om deres hovedmotivasjon for å etablere dere i Singapore?
- Hvor er hovedkontoret til deres selskap lokalisert
- Hvis denne beslutningen kunne tas igjen, og hvis du ekskluderer flyttekostnader, ville hovedkontoret fortsatt være lokalisert der det er?

- Anser du samhandling med leverandører som viktig å utvikle ideer, produkter og innovasjoner.
- Hvordan foregår denne samhandlingen? (Ansikt til ansikt?)
- Bedriver deres bedrift forskning og utvikling?
- Hvor mye av deres ressurser brukes til dette?
- Hvor er dette lokalisert?
- Hvordan føler du deres virksomhet blir ivaretatt og stimulert av de lokale myndigheter?
- Hvordan føler den norske avdelingen rammevilkårene de får er?

Refleksjoner om den maritime klyngen i Oslo sin framtid

#### Appendix IV: Survey

## **Norwegian maritime companies in Singapore**

Published from 30.05.2007 to 06.07.2007

25 responses (25 unique)

### **1. In which part of the maritime cluster is your company?**

Alternatives	Percent	Value
1 Shipowner	24,0 %	6
2 Ship industry	12,0 %	3
3 Service sector	64,0 %	16
Total		25

### **2. If your company belongs to the SHIP INDUSTRY, please specify:**

Alternatives	Percent	Value
1 Ship construction and repair	0,0 %	0
2 Ship equipment	38,5 %	5
3 Ship engines	0,0 %	0
4 Other related industries	7,7 %	1
5 Other, please specify	53,8 %	7
Total		13

#### **Alternative Answers**

Manufacturer  
Supplier of drilling equipment  
Finance  
Transportation of chemicals

### **3. If your company belongs to the SERVICE SECTOR, please specify:**

Alternatives	Percent	Value
1 Shipbroker	13,3 %	2
2 Insurance	13,3 %	2
3 Banking and financial services	6,7 %	1
4 Ship consultants	13,3 %	2
5 Classification	0,0 %	0

6 Other, please specify	53,3 %	8
Total		15

### Alternative Answers

Provision of meteorological and oceanographic monitoring systems  
 Information technology and Communication  
 Lawfirm  
 Law, consultancy, directorship  
 Manufacturer  
 Software for shipping industry  
 Ship's agent service

### 4. When did your company establish in Singapore?

Alternatives	Percent	Value
1 Before 1970	4,3 %	1
2 1970-1979	0,0 %	0
3 1980-1989	8,7 %	2
4 1990-1994	13,0 %	3
5 1995-1999	30,4 %	7
6 2000-2004	13,0 %	3
7 2005 or later	30,4 %	7
Total		23

### 5. What was the main motivation for establishing in Singapore?

Alternatives	Percent	Value
1 Proximity to the market	60,0 %	15
2 Being a part of the cluster	20,0 %	5
3 Other, please specify	20,0 %	5
Total		25

### Alternative Answers

Tax  
 Following clients - who follow market...  
 Positive business environment and positive authorities which understands that international business needs international tax regime  
 Predictable political and financial environment in addition to a cluster  
 Service Asia Pacific region

### 6. Where is the headquarters of your company situated?

Alternatives	Percent	Value
1 Oslo	52,0 %	13
2 Singapore	24,0 %	6
3 Other, please specify	24,0 %	6
Total		25

### Alternative Answers

UK  
 Kristiansand  
 Kristiansand  
 Bergen  
 Arendal  
 Bergen, Norway

**7. If you were to relocate your headquarters, would your company have done so? (Exclude costs involved when answering this question.)**

Alternatives	Percent	Value
1 Yes	20,0 %	5
2 No	36,0 %	9
3 Don` t know	44,0 %	11
Total		25

**8. How important is cooperation with suppliers/customers in order to create new ideas, products and processes?**

Alternatives	Percent	Value
1 Not important	4,0 %	1
2 Of some importance	0,0 %	0
3 Important	28,0 %	7
4 Very important	68,0 %	17
5 Don` t know	0,0 %	0
Total		25

**9. Is face-to-face contact important in order to create new ideas, products and processes?**

Alternatives	Percent	Value
1 Not important	0,0 %	0
2 Of some importance	4,0 %	1
3 Important	40,0 %	10
4 Very important	56,0 %	14
5 Don` t know	0,0 %	0
Total		25

**10. Do you consider it important sharing information, even with competitors, in order to enhance the process of innovation?**

Alternatives	Percent	Value
1 Not important	28,0 %	7
2 Of some importance	40,0 %	10
3 Important	28,0 %	7
4 Very important	4,0 %	1
5 Don` t know	0,0 %	0
Total		25

**11. How much (in percentage of total costs) does your company spend on business travels? (Please give an estimate.)**

Alternatives	Percent	Value
1 Less than 0.5%	8,7 %	2
2 0.6-1.0%	4,3 %	1
3 1.1-1.5%	4,3 %	1
4 1.6-2.0%	8,7 %	2
5 2.1-2.5%	8,7 %	2
6 2.6-3.0%	13,0 %	3
7 3.1-3.5%	4,3 %	1
8 3.6-4.0%	13,0 %	3
9 4.1-4.5%	0,0 %	0
10 4.6-5.0%	4,3 %	1
11 More than 5.0%	30,4 %	7
Total		23

**12. Does your company invest in R&D (research and development)?**

Alternatives	Percent	Value
1 Yes	54,2 %	13
2 No	29,2 %	7
3 Don` t know	16,7 %	4
Total		24

**13. If YES, how much does your company use (in percentage of total costs) on R&D? (Please give an estimate.)**

Alternatives	Percent	Value
1 Less than 1.0%	7,7 %	1
2 1.1-2.0%	7,7 %	1
3 2.1-3.0%	15,4 %	2
4 3.1-4.0%	30,8 %	4
5 4.1-5.0%	23,1 %	3
6 5.1-10.0%	0,0 %	0
7 10.1-15.0%	7,7 %	1
8 15.1-20.0%	0,0 %	0
9 More than 20.0%	7,7 %	1
Total		13

**14. If YES, where is the core R&D activity situated?**

Alternatives	Percent	Value
1 Norway	56,3 %	9
2 Singapore	31,3 %	5
3 Don` t know	12,5 %	2
Total		16

**15. Is your company satisfied with the terms of conditions provided by the Singaporean authorities?**

Alternatives	Percent	Value
1 Not satisfied	0,0 %	0

2	Partly satisfied	8,0 %	2
3	Satisfied	44,0 %	11
4	Very satisfied	40,0 %	10
5	Don` t know	8,0 %	2
Total			25

**16. Is your company satisfied with the contribution from Regional innovation enhancing actors, such as International Enterprise or Port Management Authority etc.?**

Alternatives	Percent	Value
1 Not satisfied	4,0 %	1
2 Partly satisfied	4,0 %	1
3 Satisfied	32,0 %	8
4 Very satisfied	16,0 %	4
5 Don` t know	44,0 %	11
Total		25

**17. In what way does these organizations facilitate innovation in your company (conferences, knowledge sharing etc.). Do you find their work important for the knowledge creation in your company?**

The keep the conditions for doing business world wide competitive. And by the mass of companies transferring here, the cluster of competence, services and business is moved here.

Co-operation with shipyards in development of new technology and solutions.  
Se below

No

Yes.

Conferences and networking which allows for further developments of ideas etc.  
Not important

Assume You mean MPA (Maritime and Port Authority of Singapore) which is flag state and issuer of AIS (Approved International Shipping Enterprise Status) on behalf of Ministry of Transport. They are extremely active in building up a full knowledge based shipping cluster with good incentives. Their aim is not to compete with flags of convenience, but to promote quality companies. The Norwegian contingent in Singapore have almost doubled from 600 pers in 2002 to almost 1200 today. Most of these people are shipping executives with extensive shipping experience. Instead of transferring their knowledge to younger generations of Norwegians, Singapore now benefits from our know-how. As shipping plus oil & gas are the only true international business in Norway, the loss to the Norwegian cluster is dramatic.

Conferances

MPA as flag state manager for most of our vessels is very proactive and supportive and one of the major reason why we have change flag of most of our vessels to Singapore flag.

None

No relations as yet.

Yes, it is important to keep close contacts through networking and attend seminars to enhance and impart knowledge for the improvements of the industry

**18. Do you have additional comments to the questions and themes raised in this survey?**

Norway has lost a large part of their maritime importance forever. There are still some businesses to protect, but the national understanding of world wide business has to change radically

The major players within the ship/rig building industry in Singapore have developed a high degree of innovative thinking and capability. Together with Norwegian experience within offshore constructions and operation this may be merged into innovative development of new solutions in rig design and application of great importance worldwide.

This week Singapore awarded more than 60 companies status (read: tax incentives) as "global trading companies".

Shipping is effectively service providers to the trading companies. In Singapore the shipping cluster and the trading cluster "merge"...

Development of Singapore as a IMC and cluster has been very positive the 12 years we have operated out of the city state.

Service activity was already there in 1995, but since there more and more people are coming both as Owners, managers and operator which means their services is following up.

Irrelevant areas: 1. There is no R&D in maritime services such as insurance. 2.

Moving of Headquarters - Where else in the world can you find more appropriate for us to operate our Headquarters when we are founded in Singapore?

**19. Do you have comments regarding the questionnaire or technical issues concerning the survey?**

Where there is a choice between alternative answers, e.g. reasons for establ. in Singapore, there are several reasons and one single reason is not the right answer. Difficult to say the amount spent on R&D. It is part of the price paid to the yard for newbuildings where the R&D development has been implemented.

MPA (Maritime and Port Authority) is managing tax incentives to shipping industry - the activity has been moved from IE

Singapore. Incentives come at a cost - i.e. spending in Singapore. Your question is therefore not precise enough to get the correct answers.